JUL 30 1932

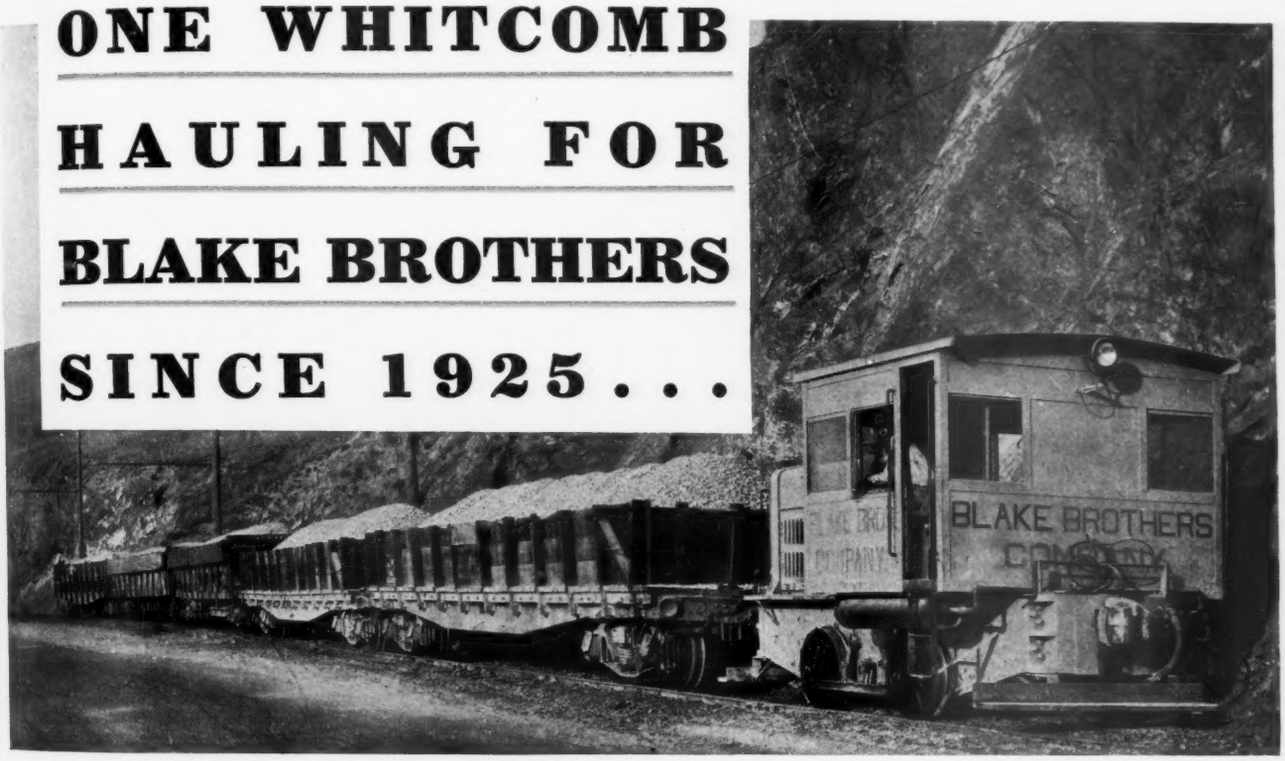
Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

July 27, 1932

ONE WHITCOMB HAULING FOR BLAKE BROTHERS SINCE 1925 . . .



To take an 80-ton loaded gondola car around a 40° curve and up a 3% grade is just one of the tough jobs of hauling to be done in the quarry of Blake Brothers Company, San Francisco.

For approximately eight years one 20-ton Whitcomb Locomotive has been doing every hauling and switching job at Blake Brothers' quarry. This includes moving twenty empty gondola cars in and twenty loaded cars out per day, covering a half mile main line to the wharf, and doing all switching and spotting for loading and dumping.

This owner grinds valves, takes up bearings and looks at piston rings once a year. Outside of that there have been few repairs.

Blake Brothers' Whitcomb consumes about 3 gallons of gasoline per hour. "Oil consumption is very low, but due to extremely dusty working conditions it is changed once a month; very little is used between times."

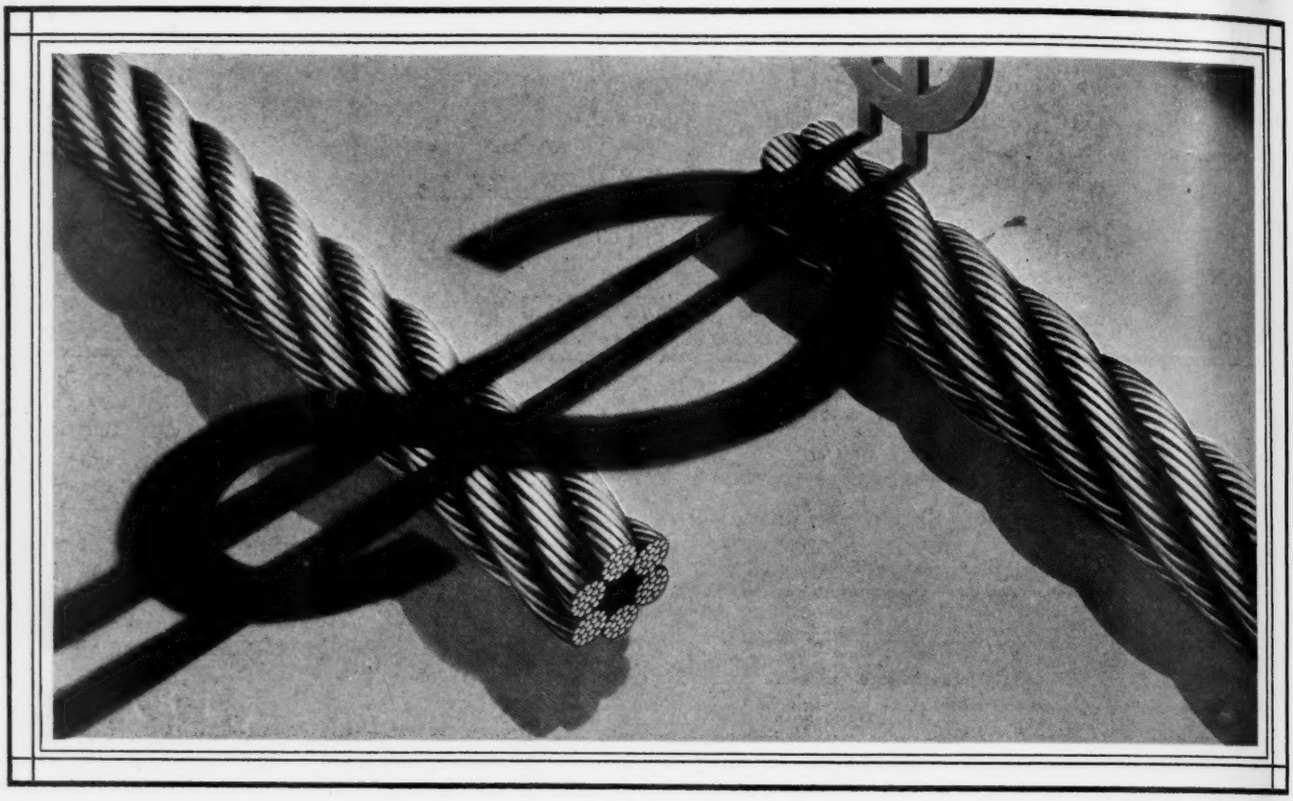
There is a type and size of Whitcomb for efficient, dependable and economical hauling on any project.

THE WHITCOMB LOCOMOTIVE COMPANY

SUBSIDIARY OF THE BALDWIN LOCOMOTIVE WORKS

ROCHELLE - - ILLINOIS

Since September 11, 1929, the largest net paid A. B. C. circulation in the field



About the *Dollar* SIDE of Wire Rope service

When you buy wire rope you want a rope which will give you *safe* service. You also want a rope which, consistent with this safety, will insure *lowest* possible rope cost per ton of material handled or per other unit of work.

On this exacting basis, the use of Roebling Wire Rope will assure you of a maximum return in service for your rope dollar.

There are three principal reasons for this. First, because there is a Roebling Rope *exactly* suited to each wire rope need (see *"Wire Rope for all purposes"* at right). Secondly, because Roebling is free to make absolutely unbiased recommendations. Thirdly, because of the great stamina of Roebling Acid Steel Rope Wire.

We can confidently assert that when gauged by the work performed NO wire rope, regardless of make or construction, will show lower general-average operating costs than Roebling.

JOHN A. ROEBLING'S SONS COMPANY, TRENTON, N. J.

Wire · Wire Rope · Copper & Insulated Wires & Cables · Welding Wire · Flat Wire · Wire Cloth & Wire Netting

Atlanta Boston Chicago Cleveland Los Angeles New York Philadelphia
Portland, Ore. San Francisco Seattle Export Dept., New York, N. Y.

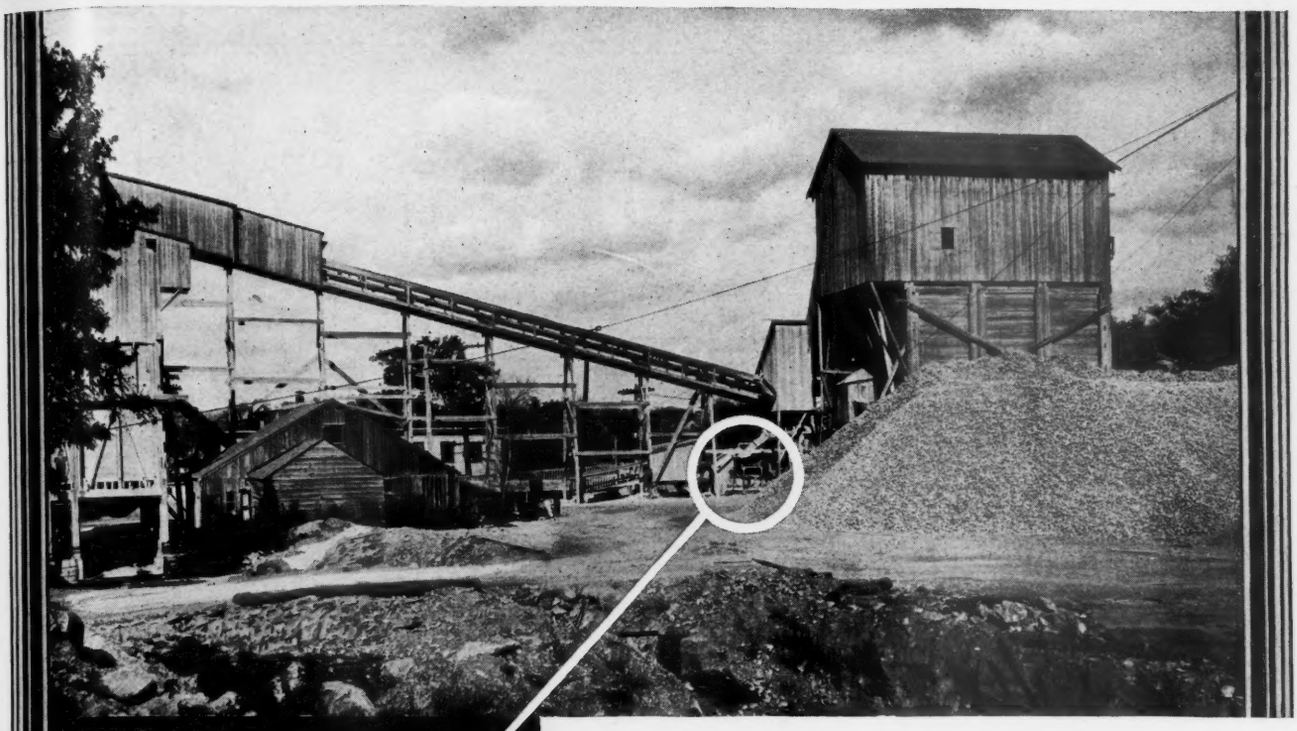
A plain statement about Wire Rope Economy

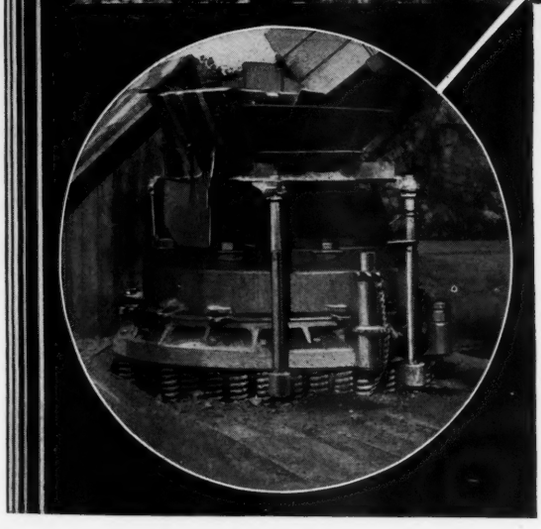
Roebling does not indulge in nor encourage sweeping claims of superior wire rope economy. Such claims, if generally made, would merely confuse the rope user. ¶ For the guidance of rope buyers, however, Roebling does assert that when gauged by the work performed, NO wire rope, regardless of make or construction, will show lower general average operating costs than Roebling.

Wire Rope for all purposes

The importance of selecting the right rope for each use cannot be too strongly emphasized. For no one rope will meet all requirements. ¶ Roebling makes wire rope of a great variety of types and designs, including Standard Right, Left, Lang, Preformed and Alternate Lays, in all degrees of rope and strand flexibility. ¶ The great stamina of all Roebling Ropes is primarily due to the quality of Roebling Wire. This Acid Steel Wire is renowned for its fatigue resisting and wearing qualities. No better rope wire is produced. ¶ "BLUE CENTER" STEEL is the highest grade and is generally recommended for severe duty.

JOHN A. ROEBLING'S SONS COMPANY





Modernize That Old Plant
—Changing Conditions Demand It

A PROBLEM confronting some of the older crushing plants is that of producing finer crushed materials at lower cost. This was true of the West Roxbury Trap Rock Company of West Roxbury, Mass., an old producer in that locality. The problem was met by modernizing with modern equipment. Among the new machinery installed was a 5½ foot Symons Cone Crusher in 1929; then in 1930 when a demand arose for "pea" sizes, a 3 foot Cone was added.

Other prominent producers, too, know the advantages found only in the Symons Cone. For delivery of a uniformly fine product in big capacity, they have no equal. Why take a chance of disappointment by trying to revamp your old crushing equipment? Install a modern Symons Cone Crusher and get modern performance from your plant.

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Diesel Engines—Steam Engines

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Subway Terminal Building

SYMONS CONE CRUSHERS

Pit and Quarry

With which is consolidated
CEMENT-MILL & QUARRY

Volume 24 July 27, 1932 Number 9

MEMBER AUDIT BUREAU OF CIRCULATIONS

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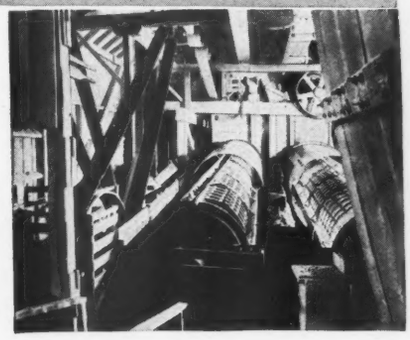
HAVE YOU DISCOVERED THOR THE NEW GOODYEAR BELT?



FROM all through the rock products industry — and many other industries where fast, severe drives are the rule—come reports of great belt efficiency and economy discoveries with Goodyear THOR Belt, seamless*.

A very ingenious protective construction characterizes this belt. It is completely covered by a heavy fabric envelope which is part of the ply structure of the belt itself.

With no central seam in the envelope, there is no place in the center to open up under flexing strains.

The edges being covered by the envelope, no fray may creep in from the sides to cause ply separation and other structural weaknesses.

The G.T.M.— Goodyear Technical Man — is successfully specifying Goodyear THOR Belting, seamless*, on Screens, Elevator, Conveyor, Feeder and Compressor Drives. His analyses of rock plant needs for belting, hose, molded goods, packing and other Goodyear Mechanical Rubber Goods, are saving money and trouble in many plants. To get in touch with the G. T. M. on your plant equipment problems, write to Goodyear, Akron, O., Los Angeles, Calif., or your nearest Goodyear Mechanical Goods Distributor.

TUNE IN:

Goodyear invites you to hear the Revelers Quartet, Goodyear Concert-Dance Orchestra and a feature guest artist every Wednesday night, over N. B. C. Red Network, WEAF and Associated Stations

**Goodyear THOR Belting, seamless, is made in widths up to and including 16" — THOR quality of special construction is available for larger sizes*

THE GREATEST NAME IN RUBBER

GOODYEAR

BELTS • MOLDED GOODS • HOSE • PACKING

Classified Buyer's Guide

A Directory of PIT AND QUARRY Advertisers Arranged According to Product

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified, if brought to the attention of the Advertisers' Service Department.

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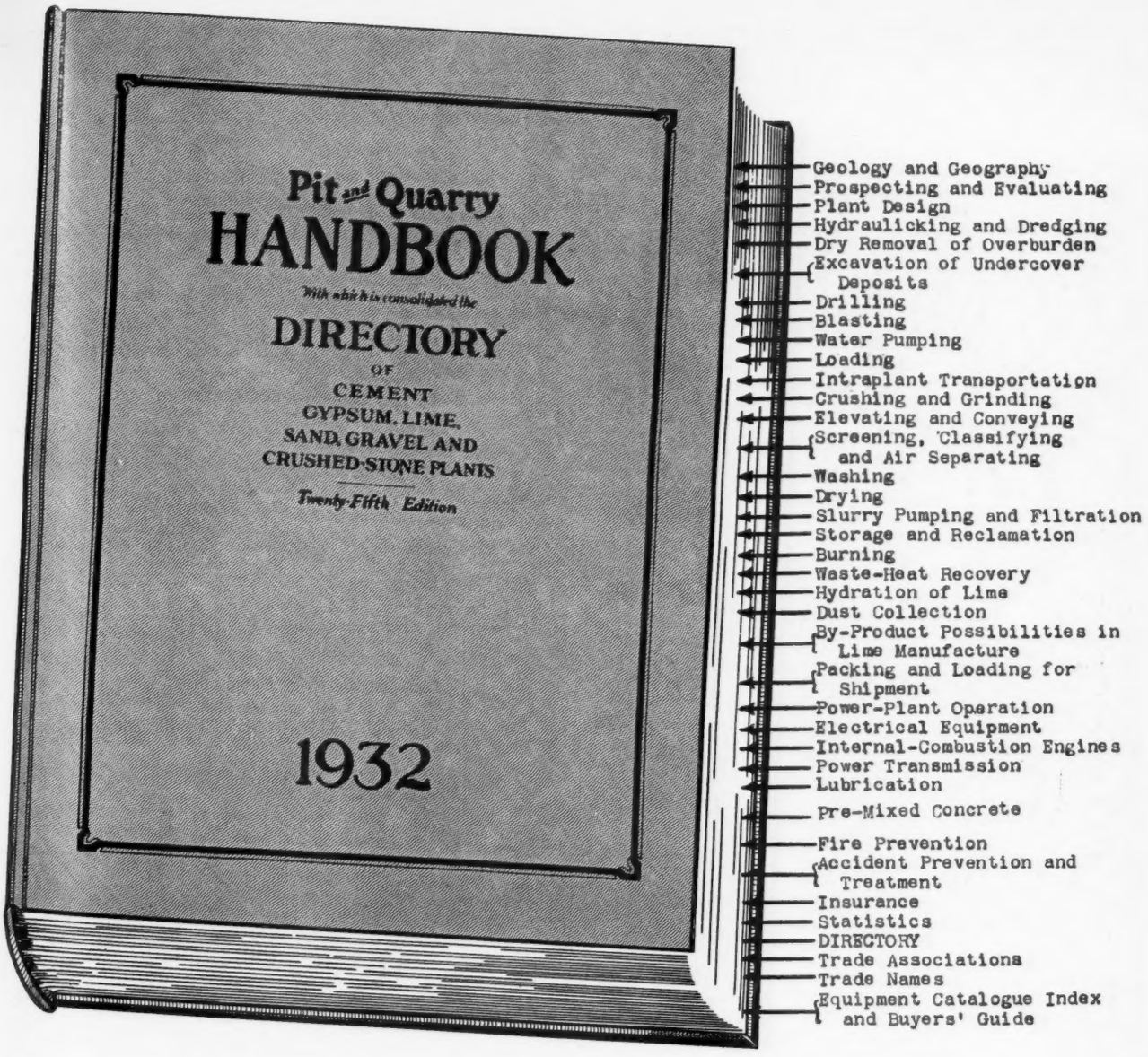
Wire and Cable (Electric)
Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)



Here It Is, at a Glance—Brand New!

The illustration above shows, graphically, the contents of the 1932 edition of Pit and Quarry HANDBOOK and Directory, just off the press. The only book of its kind. Every section has been brought right up to the minute. The Directory is the largest and most complete listing of producers ever compiled—and every item is *verified*.

If you have not already purchased your copy of this indispensable book, order now, before the limited printing is exhausted.

Pit and Quarry Handbook and Directory, 1932 edition.....	$5.00	Clubbed with a 1-year subscription to Pit and Quarry.....	$6.00
Pit and Quarry Handbook and Directory, 3 consecutive editions..	$12.00	Clubbed with a 3-year subscription to Pit and Quarry.....	$15.00

The above rates for United States and Possessions, Central and South America. Elsewhere, add $1.00 per year per publication.

Pit and Quarry Publications

538 S. Clark St., Chicago, Ill.

PIT AND QUARRY HANDBOOK | PIT AND QUARRY | PIT AND QUARRY DIRECTORY

Why one pump will often do the work of two
This is the SECRET
The sides of the impeller and pump casing are hydrosealed against abrasion by means of clear water which is introduced on both sides of the impeller. Because of close clearances between the shrouds and sideplates, the initial pressure of the clear water is boosted above the pressure in the main volute. The annular clearances are thus continuously filled with clear water, flowing into the volute, not abrasives laden water flowing in the opposite direction. The pump can therefore maintain its initial high efficiency and discharge pressure for an indefinite period of time. . . . May we estimate what the Hydroseal Pump will do in your plant? We will guarantee the savings shown in our estimate. Write us, describing your requirements, or for a copy of our bulletin describing the pump. . . . We can make shipment on eight standard sizes of Hydroseal Pump within two weeks. The Allen-Sherman-Hoff Co., 215 S. 15th Street, Philadelphia. Offices in principal cities.
HYDRO SEAL
Why we seldom find a plant that cannot save one-third in power with no decrease in production
Why we can usually pump one-half more material with no increase in power
Why initial high efficiencies are maintained throughout the life of the pump
Why maintenance is cut to a fraction

VOLUME 24 NUMBER 9

Pit and Quarry

With which is consolidated

CEMENT-MILL & QUARRY

CHICAGO, JULY 27, 1932

Ohio Stone Assn. in Meeting at Findlay

COMBINE BUSINESS, PLEASURE

The first of a series of educational and recreational meetings to be held by the Ohio Crushed Stone Ass'n in various parts of the state was held June 28 at the Findlay Country Club at Findlay, O., with more than 100 producers and guests present from all parts of Ohio.

H. Fort Flowers, president of the National Lime & Stone Co., of Findlay, was chairman. He was introduced by Dr. William B. Guitteau, of Toledo, who gave the address of welcome.

Luncheon was served in the spacious dining room of the country club and was followed by a series of talks. At 3 o'clock a recreational program was carried out consisting of golf, baseball and horseshoe pitching.

E. W. McCall, secretary-treasurer, of the Tarbox-McCall Stone Co., of Findlay, was the chairman of the reception committee; Fred Patterson, of the National Lime & Stone Co., was chairman of the luncheon and golf committee and Frank Tarbox, general superintendent of Tarbox-McCall Co., was in charge of the horseshoe contests.

The guests present included county surveyors, county highway superintendents, city engineers and state highway engineers from northwestern Ohio. Other meetings will be held in the near future at Buckeye Lake, Wilmington, O., and Twin Lakes, near Cleveland.

The program was as follows:

"1932 Highway Economics"—Fred Swineford, Columbus, O., chief engineer, Ohio Crushed Stone Ass'n.

"Aggregates for Bituminous Pavements"—H. F. Kriege, Toledo, engineer of tests, France Stone Co.

"The Preparation of Aggregates"—C. G. Knoblauch, Findlay, general superintendent National Lime & Stone Co.

Discussion led by K. L. Rothermund, of Columbus, engineer of federal projects, state highway department.

"Plant-Mixed Bituminous Pavements"—Bernard E. Gray, New York, N. Y., highway engineer, The Asphalt Institute.

"Application of Bituminous Materials"—George Martin, of New York, N. Y., consulting engineer, Tarvia department, the Barrett Co.

Massachusetts Plan to Raid Road Fund Beaten

On the closing day of the recent legislative session, the Massachusetts Senate, by a vote of 23 to 17, rejected the bill that had already passed the House and provided for a diversion of $2,000,000 from the highway fund to the cities and towns for welfare purposes.

This completed the downfall of the entire program recently advocated by the Governor, as the House had previously acted adversely on all items except the highway-fund diversion.

Acme Limestone Co. Sets Off Blast at Fort Smith

Enough stone to keep its plant busy for the entire season was brought down at a recent blast in the Fort Springs quarry of the Acme Limestone Co. of Alderson, W. Va.

Fifty drill holes were loaded with 60,000 lb. of explosives for the shot, which was reported to have been highly successful, good breakage having been obtained.

Company officials and about 400 spectators, attracted by newspaper accounts that the blast was to be detonated, witnessed the shot.

Penn-Dixie Given U. S. Hospital Cement Award

The Des Moines, Ia., plant of the Pennsylvania-Dixie Cement Corp. has been awarded a contract for 22,500 bbl. of cement to be used by the H. G. Christman Co. in erecting a new United States veterans' hospital at Des Moines.

46 Workers Employed at Kansas Crushing Plant

Forty-six men are employed in two shifts at the crushed-stone plant operated by W. D. Shay near Marion, Kan. Practically the entire output is being used in highway construction in that vicinity.

Limestone Producers Form Sales Company

ECONOMY MOVE, SAYS OFFICIAL

Savings in production and distribution costs in the Indiana limestone industry will be accomplished by the Hoosier Limestone Corp. of Bloomington, Ind., according to an announcement by J. L. Torphy, an official of the new concern, capitalized at $250,000.

Incorporators are Jess G. Ray, president of the Independent Limestone Co. of Bloomington; William H. Johnson, president of the Bloomington Limestone Co.; Philip C. Furst, president of the Carl Furst Quarries of Bedford; B. G. Hoadley, president of the B. G. Hoadley Quarries, Inc., of Bloomington; J. L. Torphy, president of the Shawnee Stone Co. of Bloomington, and John Edgeworth of Kankakee, Ill., an officer in the Victor Oolitic Stone Co. of Bloomington.

The purpose and manner of operation of the Hoosier Limestone Corp. are explained in the following statement by Mr. Torphy: "Maintenance of separate sales organizations, duplication of sales campaigns, of advertising and of promotion activities, as carried out individually by several of the producers in the Bloomington-Bedford district, have occasioned an unwarranted economic waste which has not only added to production and distribution costs, but has necessitated an ever increasing capital outlay.

"The Hoosier Limestone Corp. proposes to overcome this economic waste. It will buy the output of a number of producers and, in turn, will distribute block and sawed stone to the cut-stone trade throughout the country. The individual producer, with this definite market for his stone before him, can practically eliminate his sales costs. He also can preclude the necessity of carrying forward surplus quarrying to get unusual or extra sized stock or a surplus of any one particular grade of stone. He need not carry overloaded inventories. Individual quarries need not therefore be depleted unnecessarily, thus preserving this great natural resource of Indiana for use over a much longer period than could have possibly existed under the heretofore prevailing wasteful practices."

N. C. S. A. Directors in Summer Gathering

SESSION AT ATLANTIC CITY

Utmost confidence in the early recovery of business in the crushed-stone industry was expressed by members of the board of directors of the National Crushed Stone Assn., who met July 15 and 16 at the Ambassador Hotel at Atlantic City. It was the consensus of opinion of the industry's leaders who gathered at the Jersey seaside resort that the association should play a leading part in helping to guide the nation's business back to normalcy. It was felt that the disturbing factors which have held the country in their grasp for so many months are gradually being eliminated and that improved sentiment is everywhere being demonstrated.

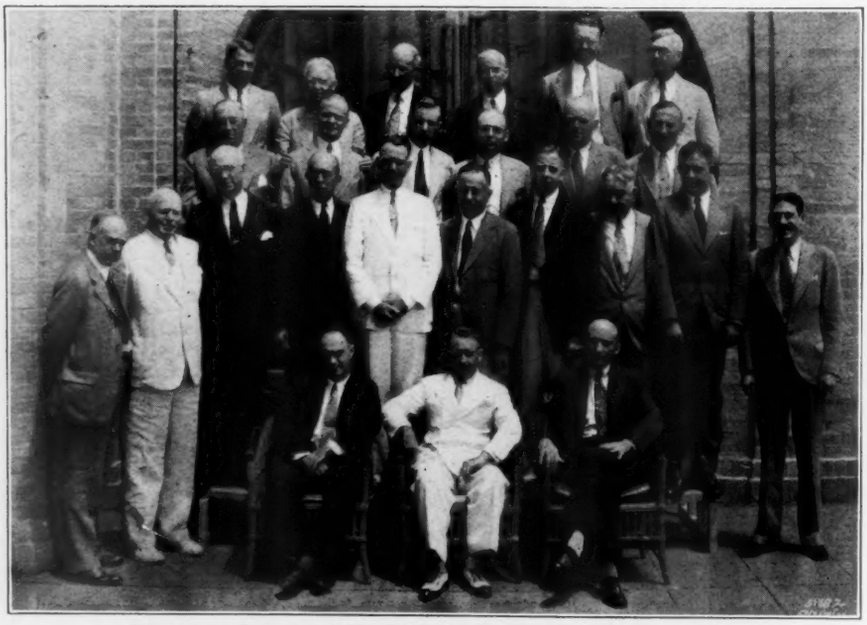
The feeling of the directors was that the work of the association should continue as always, that any curtailment of activities would hinder those advances already made by the organization and its product in achieving public approval.

Plans for the 1933 convention were discussed and the time and place of the meeting were definitely decided upon. It was determined, however, that until a few minor details are ironed out, no official announcement of the gathering would be made.

The increasing acceptance of stone-sand, the rising importance of durability tests for aggregates in state specifications, and other activities of the engineering committee during the last half year were reported upon by A. T. Goldbeck, director, bureau of engineering.

Attendance included the following:

W. M. Andrews (Lake Erie Limestone Co., Youngstown, O.).
J. Barab (Hercules Powder Co., Wilmington, Del.).
L. J. Boxley (Blue Ridge Stone Co., Roanoke, Va.).
J. R. Boyd (National Crushed Stone Assn., Washington, D. C.).
Ed. M. Buck (PIT AND QUARRY, Chicago, Ill.).
F. O. Earnshaw (Carbon Limestone Co., Youngstown, O.).
A. T. Goldbeck (National Crushed Stone Assn., Washington, D. C.).
Abe Goldberg (Allis-Chalmers Mfg. Co., Milwaukee, Wis.).
O. M. Graves (General Crushed Stone Co., Easton, Pa.).
F. T. Gucker (John T. Dyer Quarry Co., Norristown, Pa.).
W. E. Hilliard (New Haven Trap Rock Co., New Haven, Conn.).
A. S. Lane (John S. Lane & Son, Inc., Meriden, Conn.).
Thos. McCroskey (American Limestone Co., Knoxville, Tenn.).
Bernard A. McKinney (West Roxbury Trap Rock Co., Boston, Mass.).
John Prince (Stewart Sand & Material Co., Kansas City, Mo.).
Russell Rarey (Marble Cliff Quarries Co., Columbus, O.).
A. W. Randle (PIT AND QUARRY, Chicago, Ill.).
P. B. Reinhold (Reinhold & Co., Pittsburgh, Pa.).
John Rice (General Crushed Stone Co., Easton, Pa.).
H. M. Rigg (Acme Limestone Co., Alderson, W. Va.).
J A. Rigg (Acme Limestone Co., Alderson, W. Va.).
N. C. Rockwood (*Rock Products*, Chicago, Ill.).
F. W. Schmidt (North Jersey Quarry Co., Morristown, N. J.).
L. W. Shugg (General Electric Co., Schenectady, N. J.).
T. I. Weston (Weston & Brooker Co., Columbia, S. C.).
Harold Williams (Boston, Mass.).
A. L. Worthen (Connecticut Quarries Co., New Haven, Conn.).



Directors and guests of N. C. S. A. photographed at Atlantic City.

Action on Silicosis Cases Is Continued

DELAY SUITS THREE MONTHS

Continuances were granted in eleven silicosis cases called for hearing before Max Broderic, arbitrator for the Illinois industrial commission in the county court at Ottawa, Ill., on June 28.

Broderic granted three-month continuances in each of the eleven cases of Fred Jensen vs. Ottawa Silica Co.; Oral Cornelison vs. Ottawa Silica Co.; James Telfer vs. Ottawa Silica Co.; Elmer Schmitt vs. Ottawa Silica Co.; Orville Reynolds vs. Ottawa Silica Co.; William Baldride vs. Ottawa Silica Co.; Lester J. Mettille vs. Ottawa Silica Co.; Earl McInturf vs. Ottawa Silica Co.; Thomas Rossitor vs. Pehrson Bros. Co.; John Kizmich vs. National Plate Glass Co.; Charles Clouse vs. Wedron Silica Co.

The plaintiff in the last case has died since the proceeding was started. Shortly before his death he was plaintiff in a personal injury case tried against the Wedron Silica Co., in which he was awarded a $10,000 verdict. The company took an appeal and the case is now pending in the Illinois supreme court.

Self-Styled Pre-Mixed Inventor Asks Damages

Claiming that he had an oral contract for a one-third ownership and one-third of profits of the Pioneer Sand & Gravel Co. of Seattle, Wash., John A. Peabody has filed a claim for $394,000 in the superior court of Judge Kazis Kay at Seattle.

According to his story, Peabody in 1924 went to the late H. F. Ostrander, president of the company, and told him of a "secret" process he had invented to mix cement at a central-mixing plant and transport it by motor trucks to the scene of construction, according to the *Seattle Post-Intelligence*.

Seeks to Remove Gravel from River at Waterloo

The Waterloo Dredging Co., Waterloo, Ia., in the sand-and-gravel dredging business for the past seven years, will engage in the business of a more intensive scale, according to Ernest H. Matthias, manager, if present plans materialize. The Waterloo Boat Club is sponsoring a movement to clear a channel in the Cedar River between Waterloo and Cedar Falls. Under existing regulations of the Iowa conservation commission, gravel or sand taken from a stream bed must bear a royalty to be paid to the state. The proposal as regards the channel change and opening will come in the event that the gravel and sand may be removed by the dredging company without cost.

Hoover Signs Relief Measure on July 21

MILLIONS FOR CONSTRUCTION

President Hoover on July 21 signed the compromise relief bill making available millions of dollars for construction purposes.

The law provides the allocation to the states of $120,000,000 for emergency highway construction. This fund will be prorated among the states on the basis of the regular federal aid plan. The appropriation is available as state funds and may be used to match regular federal aid. The amounts advanced must be reimbursed to the federal government over a period of ten years commencing in 1938, that being the year when the final payments on the $80,000,000 advance of 1931 will be completed.

All contracts covering the expenditure of the $120,000,000 fund must contain a minimum rate of wages to be predetermined by the state highway departments and the rate must be included in all proposals for bids. It is of importance to note that the law provides specifically that the $120,000,000 highway appropriation must be used "for work on the federal aid highway system performed *before July 1, 1933*." States, therefore, must proceed at once to use the funds, for if the highway work is not completed by June 30 of next year, the authorization is automatically withdrawn. Producers of aggregates and cement should, of course, bend every effort toward urging their states to start the ball rolling immediately.

The public-works section of the bill as signed by the president carries a total appropriation of $322,224,000. With the exception of the $120,000,000 for highways and $16,000,000 for national forest and park roads, etc., the funds for the other public-works projects shall not be expended if the secretary of the treasury "certifies to the president that the amount necessary for such expenditures is not available and can not be obtained upon reasonable terms."

The group of public works subject to this restrictive clause includes: river and harbor projects $30,000,000; flood control $15,500,000; continuance of construction on the Hoover Dam $10,000,000; yards and docks of the navy department $10,000,000; emergency construction of public buildings $100,000,000; and various miscellaneous projects.

Illinois Quarrymen Seek Recognition for Product

Crushed-stone producers in southern Illinois have instituted a vigorous campaign for the use of their product in the state and several representatives appeared before members of the Buy Illinois Products Commission at Springfield, Ill., recently. The producers declare that Illinois-quarried materials are not always considered in road building and construction work and urged that the commission file a demand with the state highway department that Illinois stone be given preference in the award of contracts.

Among the companies reported interested in the hearing were the Anna Stone Co., Columbia Quarry Co., Illinois Electric Limestone Co., and Casper Stolle Quarry & Contracting Co.

Mississippi Gravel Firm Is Enlarging Operations

Arrangements have been completed by the Waters & McCrary Gravel Co., of Columbus, Miss., whereby it will operate the pits owned by the New Hope Gravel Co., at Rucker, Miss. Announcement of the deal was made recently by W. J. Shackelford, vice-president of the New Hope concern. "The arrangement is an ideal one," he declared, "and we are not surrendering our charter. We will continue to be known as the New Hope Gravel Co., retaining our corporate identity and possession of our deposits and equipment."

To Produce Limestone for Sugar Refineries

High quality limestone deposits located at Portneuf Siding, near Pocatello, Ida., will be developed shortly, the finished material going to sugar refineries in Idaho and Colorado for purification work.

The deposits are owned by Clara J. Wood of Pocatello, but will be worked by Frank H. Norberg of Denver, Colo., who is affiliated with Utah-Idaho Sugar Co., Amalgamated Sugar Co., and Great Northern Sugar Co.

Roche Harbor Employees Make Merry on July 4th

Employees of the Roche Harbor Lime & Cement Co. and their friends enjoyed a community celebration on July Fourth on the company grounds at Friday Harbor, Wash. A baseball game, races and other sports were enjoyed during the afternoon, topped off by a dinner in the barbecue courts in the evening, with barbecued salmon being featured as the piece de resistance.

Trade Commission Rule Forces Change in Name

Because the Federal trade commission has ruled that manufacturers of concrete products should not employ the term "stone" without qualification in their corporate names, the Pyramid Stone Co. of Houston, Tex., has changed its name to the Pyramid Cast Stone Co. The Pyramid concern has been engaged in business for the last six years. A. D. McDonald is president.

Mehren Urges Cut in Government Expenses

SAYS PUBLIC WORKS NEEDED

Government costs must be reduced, but in doing so it is highly important to distinguish between wasteful current expenditures and wise capital investment, according to Edward J. Mehren, president of the Portland Cement Assn.

Mr. Mehren's views were expressed July 11 in a letter to Robert L. Lund, president of the National Assn. of Manufacturers, which held a conference of trade organizations in New York recently to consider means of effecting economies in government.

"There is grave need for reduction in government costs," Mr. Mehren's letter said in part. "Duplicated, overlapping and wasteful functions should be eliminated. The benefits to industry and to the country should be out of all proportion to the energy required.

"It is highly important, however, to distinguish between wasteful current expenditures and wise capital investment. The latter creates employment, is not competitive with private industry, and if truly wise, finds economic justification in the money saved or earned.

"For a number of reasons, this is a favorable time to undertake needed public works. The community can 'eat its cake and have it, too.' Bonds of financially stable communities are selling at par or even at a premium. Many other high class municipal bonds are selling at small discounts. On the other hand, construction costs are off materially. The average cost of paved highways is between 20 and 30 per cent. under that of 1930. Building costs have dropped as much. Even if bonds must be sold on a 6-per cent. basis, the ultimate cost of the work to the public would be a bargain compared with the costs of work for a decade prior to 1929.

"As to the nature of wise public investment, be it noted that American cities are using thousands of miles of worn-out pavement, uneconomical to maintain and costly to users. There are 247 cities of over 1,000 population in the United States which have no sewage collection systems whatever and almost 6,000 which have no disposal plants.

"Business leaders and public officials have come to see the function of public works in speeding up the business machinery," the letter concluded, "which is added reason for keeping in mind the distinction between current expenditures and wise capital investment."

The cement warehouse of the Riverside Portland Cement Co., located at 2551 San Fernando Road which was damaged by fire recently is to be rebuilt.

Editorial

New Uses for Old Products

IN spite of the hardness of the times, many businesses are making large profits. Although the explanation is different in every case, a single basic principle lies at the root of all these successful enterprises, and that is the fact that it is possible to invent new products or to devise new uses for old products in order to meet or create new needs. The principle can be stated thus simply, but it can not be applied so easily, for sound inventive genius and the ability to see new virtues in old things are rare qualities. Most genius of that kind and most examples of the ability referred to are found outside the ranks of the industries affected; improvements come most often from without.

The lime industry has recently become the beneficiary of one such discovery of a new use for its product, and several other opportunities—one of considerable promise—appear to be about ready to open in its favor. The quality of lime which causes it to generate heat when brought in contact with water is the basis of the use first mentioned. Small quantities wrapped in individual tinfoil capsules, designed to be wound around separate locks or strands of a woman's hair and to be heated by the application of a few drops of water to an opening in each capsule, are already taking the place of elaborate permanent-waving apparatus and, so, are enlarging the field of operations of the country's thousands of beauty parlors. In spite of the average woman's yearning for permanent waving and despite, too, the frequent lowering of prices, the demand has fallen off considerably. Hence, anything that seems to promise an increase in beauty-parlor patronage will find a ready sale. The low cost of the new method, coupled with its convenience and its ability to serve many patrons at the same time, have already created a considerable demand for it. One of the companies making the new product employs 300 girls to fill the capsules; the manufacturing technique has not yet advanced far enough to have brought machine mass-production methods.

While this new use does not yet and may never require large quantities of lime—in the sense that lime makers understand large quantities—it opens a profitable new field, because the price obtained for the lime used is far above that of the qualities supplied for building-construction purposes. But another field, which should take large quantities of lime, seems about to open. This, although more in the nature of a revival of a waning and almost obsolete use of lime than of a development of a new use, centers on the use of a plastering and mortaring machine which will employ lime as one of the materials. Although not yet on the market, we are led to believe that the mechanical experimentation has developed sufficiently to justify the hope that the machine may soon be ready for general sale. The possibilities of such a machine as a means for recovering some of the plaster and mortar markets which have largely been lost to the lime industry are great enough to interest any industry even in times of prosperity. Under present conditions they may be of enormous importance and of lasting advantage.

As was said at the opening, most improvements in industry come from without the industries which they benefit, and this seems to be equally true of the new developments which have opened and are opening for the lime industry. As far as we know, neither of the ideas just mentioned originated within the lime trade. They have been developed by outside talent working in an atmosphere free from the traditions that necessarily constrict the vision of those inside the industry. In addition to providing new outlets for lime, these developments should stimulate lime manufacturers to renewed activity in research in an effort to find not only new uses for old products but new products for other uses.

Do We Really Want Stability?

MANY are the explanations offered to account for the present dilemma of business and even more numerous the nostrums suggested by way of cure. They differ as widely and exhibit as many types of theory, as many kinds of partial understanding, as the advocates who voice them. The one common idea, however, appears to be stability. If we could only stabilize business, say these well-wishers, if we could only stabilize demand, if we could only stabilize prices, if we could only stabilize costs, all would be right with us. To which we would reply that if we could only do all these things, there would be no need to do anything else, for all would be wrong with us, and our ruin would be complete.

Everyone loves ease, whether physical or mental. We hate to work too much over anything; we hate to think too much about anything. No form of life exerts itself any more than it feels is necessary to accomplish the ends sought. Among animals we name this instinct; among ourselves we like to call it reason or laziness. Whatever it is, it is inherent in us all; it lies back of all this whimpering longing for stability, this "quest for certainty," this lethargy that makes most men content to let someone else start us on the road to recovery. While most men are willing to work, not so many are willing to think; hence this unmanly wail for the removal of doubt, for economic stabilization.

Many men will tell you that they would do thus and so, they would spend money, they would borrow money, they would put their houses in order,

they would renovate their methods, they would adopt a new philosophy of life, if only they could see certainty ahead. Did they ever see it, will they ever see it, and have they the moral courage to face it and live to meet it if they could see it? How many men, alive and poor to-day, would have had the heart to face the present, if it had been pointed out to them ten years ago as the inevitable certainty that awaited them? How many men, wealthy, healthy and comfortable to-day, would face the certainty of poverty, sickness and hardship a decade hence? Certainty is a dasher of hope, for to be certain that the worst is to come is to be devoid of all prospect of bettering one's condition. Is that the kind of certainty we want?

It is good that we can not achieve certainty about anything, and it is equally good that we can not attain stability. Stabilization has a hopeful ring; it suggests soundness; it conveys the idea of Gibraltar-like permanence. But it is illusory. It is unattainable, because it is contrary to the laws of nature. Growth is constant change, a continuous facing of new conditions, an endless problem in adaptation to circumstances, in which there is a very definite kind of certainty but not the kind that men cry for. There is the certainty that he who fails to meet changing conditions can not survive, that he who meets those conditions best survives longest. That is the kind of certainty which life holds out, but it is not the stability which men believe they need and, therefore, want.

When the quack mender of broken business promises price stabilization, he offers a delusion of dangerous consequences. Improvement in business comes through competition, of which price fluidity is an essential component. To stabilize prices—that is, to fix them and keep them at predetermined levels—is to deprive business of one of its most potent forms of competitive betterment—the reduction of production cost and the consequent enlargement of selling opportunities.

When the quack "economist" promises economic stabilization, he consciously or unconsciously attempts to deceive. The stabilization he offers is commercial stagnation—a complete cessation of progression or retrogression, if one can conceive it—a state that is impossible of accomplishment, the negation of progress, the very death of life.

We prate loudly of stability and its alleged but fantastic benefits. But, could we see just what stability means, could we visualize the dullness and colorlessness of a state of stability, no man of healthy body or mind would want it, no one but a fanatic could endure it.

Although stability in the sense in which it is most often used and understood is an impossibility—a mere figure of speech—the last two years have seen a rather close approach to stability as conceived. There probably have been few times in history when human intellect has stood as nearly petrified as during those years, when men have leaned so heavily on mythical remedies, when they have appeared so helpless and hopeless, when they have been so willing to shirk responsibility and to unload it on others, when they have been so content to stand still and aghast, like savages in the presence of an eclipse.

The present period is filled with certainty—a certainty that is much too certain to suit many people. There is the certainty that business will continue to drift as long as business men are willing to let it drift and refuse to move an oar; there is the certainty that business will not get better unless business men are determined to make it better; there is the certainty that business will conquer and impoverish society if men do not rouse themselves from their lethargy; there is the certainty that if we do not work for the uncertain benefits of progress, we shall infallibly reap the certain losses of retrogression. Those are enough certainties to satisfy the average man. Will he face them? Will he lie motionless, waiting for doom to overtake him? Is he content to let destiny count him out?

Those are some of the aspects of certainty, of stability. Do we really want them?

Protect Wire Ropes in Idle Periods to Obtain Maximum Service

Protect idle wire ropes during shut-downs or slack work periods and they will be safe and ready for service, without the probability of replacement due to deterioration from the havoc of rust and corrosion.

Wire rope, like any other machine, must be protected from moisture and other damage from exposure and idleness.

Surface protection, however, is not sufficient as many "protectors" that are heavy enough to protect the outside wires, do not penetrate to the inside wires and center—they afford no protection to the unseen wires.

Unless the inside wires are thoroughly protected, corrosion is likely to result in broken wires, when the "load" is again applied, even though the outside is apparently well protected.

Rope life is very materially reduced by idleness, and even though there may appear to be sufficient lubrication and protection reaching the inside wires, like the lubrication of any machine, unless there is motion or working to carry the lubrication to the working parts there cannot be complete lubrication; hence, parts not so protected become pitted from the action of corrosion. The longer the periods of idleness the greater the damage from pitting, and no amount of lubrication will restore the full measure of rope-life after this destruction has set in.

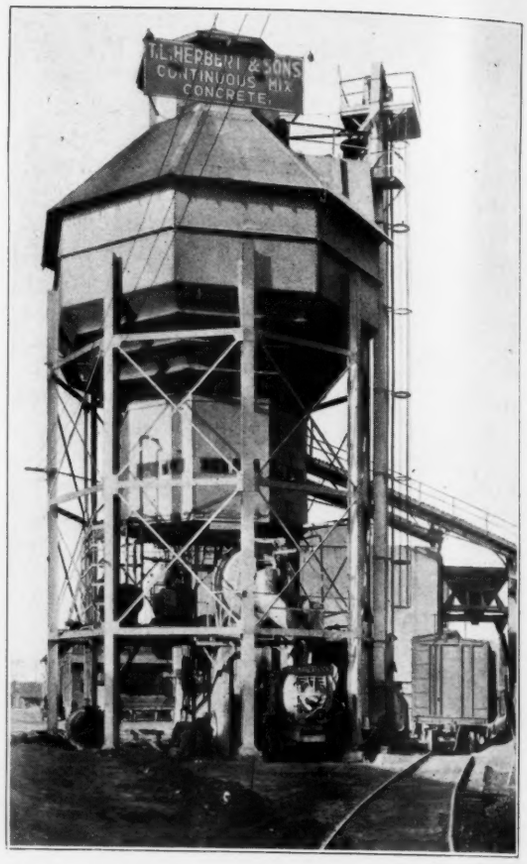
A greater percentage of the estimated or expected rope-life can, therefore, be realized if wire-rope equipment can be occasionally "worked" even though there may be no "real" work for the machine to do.—*Wire Engineering.*

This Company Gives *Service* in Selling Pre-Mixed Concrete

T. L. Herbert & Sons Plant at Nashville Employs Distinctive Operating, Merchandising Plans

By W. E. TRAUFFER

T. L. HERBERT & SONS of Nashville, Tenn., were among the pioneers in the building-supply business in that city and operate a yard with unusually complete facilities for furnishing any desired materials for any kind of construction work. On this property, located on the south bank of Cumberland River, about a mile from downtown Nashville, are sand-and-gravel, ready-mixed-concrete, and asphalt plants. Cement and all kinds of other building materials are also stored here. The company also operates another yard near, where face and common brick and hollow tile are made. The company also contracts for roofing and tinning.

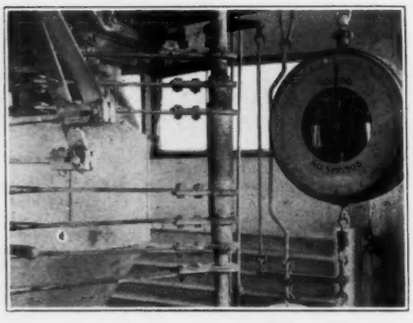


Plant with truck-loading at mixer. Cement elevator and car at right.

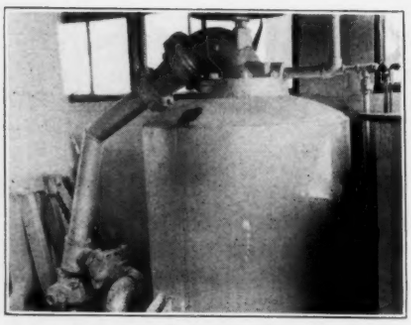
T. L. Herbert established himself in the sand-and-gravel business in 1912, having been in the building-supply and brick business for a number of years before that time. In 1919 the present gravel plant was built, and it has operated steadily since that time with only a few changes and improvements. This plant now has a capacity of about 110 tons per hr. Early in 1931 the asphalt plant was built, and the concrete plant went into operation in May of the same year. The business is now carried on by the three sons of the founder of the company.

The central-mixing plant is for several reasons one of the outstanding operations in this field. In design and in the equipment used it is distinctly a modern plant. Labor is reduced to the minimum, and the controls are centralized so that one man can operate the plant at capacity. That it can be instantly converted from a mixing plant into a dry-batching plant is only one of its many features. Its location is another factor largely responsible for its success. The proximity of the sources of supply of aggregates and cement and the nearness of the plant to the center of consumption of its product are important factors.

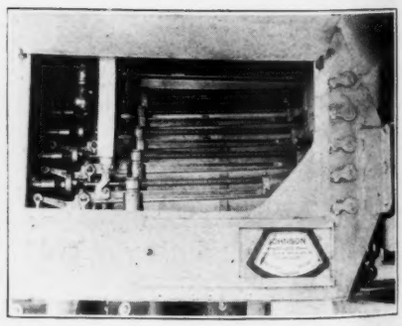
The dredge *Herbert,* which supplies all the aggregates for the plants, has a 450-hp. Worthington Diesel engine which generates power for all the equipment on board. Two stiff-leg derricks on the head end of the boat handle two 1¼-cu.yd. Williams clam-shell buckets which excavate from the river bed and deliver to a 20-cu.yd. hopper on the dredge. This feeds a series of three stationary screens which separate two sizes of sand from the gravel. The gravel is loaded direct in a barge and is brought to the plant for rewashing and sizing. The sand goes to a sump on the dredge. A 6-in. Diamond dredging pump rehandles it to a settling tank, where the sand is washed. The clean sand then passes over a stationary screen, which separates it into two sizes, concrete and masons' sand,



The cement weigh-batcher and dial scale.



The siphon-type water-measuring tank.



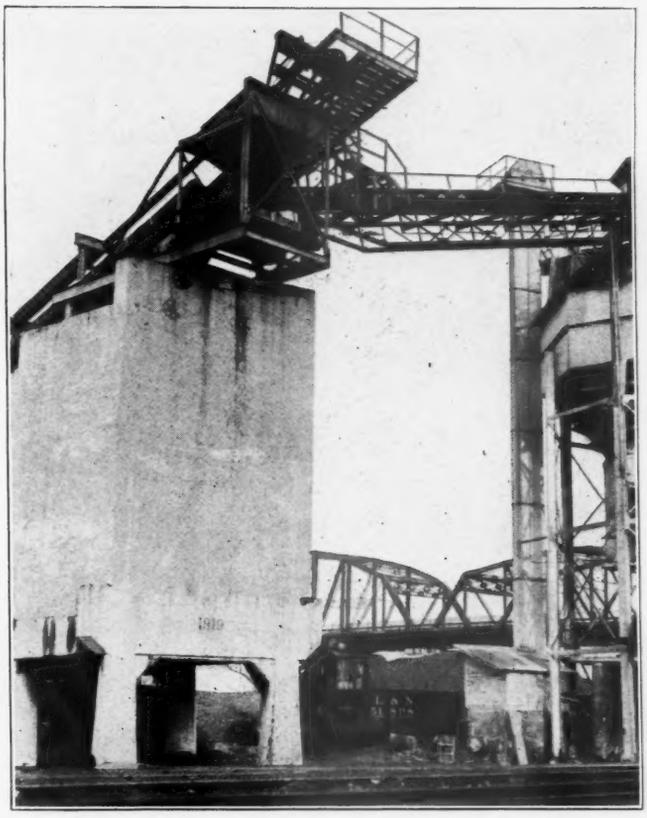
The five-beam aggregate-batcher scale.

and discharges them to barges for separate shipment to the plant.

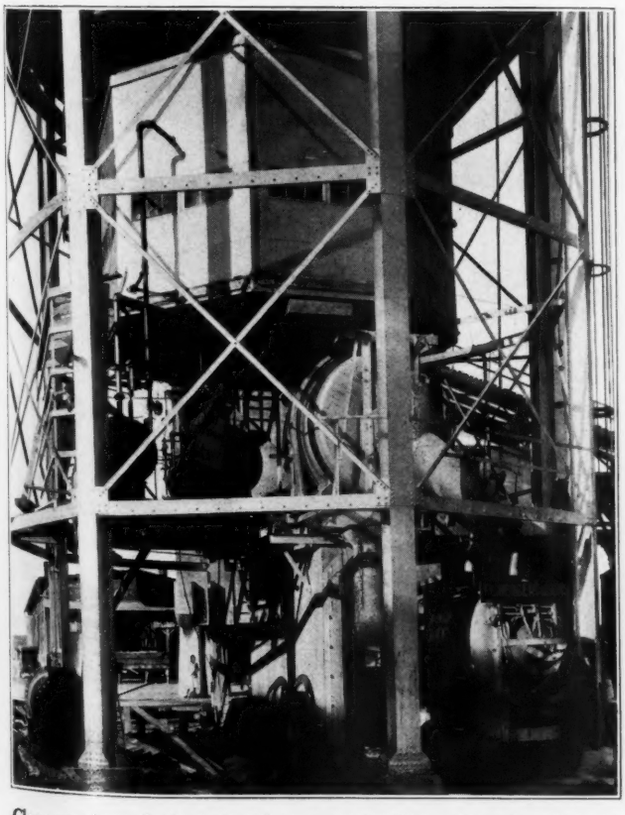
The material dredged varies considerably in size and in depth of deposit. Usually dredging is carried on to a depth of about 25 ft. The company operates seven all-steel barges, each of 210-ton capacity, which were made by the Nashville Bridge Co. These are towed by a double-wheel towboat, the *Harvey,* which has two 120-hp. Worthington Diesel engines and a small generating plant for lights. Operations are generally carried on from 14 to 25 mi. from the plant.

The gravel barges are unloaded at a dock at the plant by a stiff-leg derrick handling a 1¼-cu.yd. Williams clam-shell bucket. This fills a hopper from which the gravel is fed to a series of two 24-in. belt-conveyors leading to a hopper feeding an Arms double-deck vibrating screen. This separates the material into 3 sizes: ¾ to 1¼ in., 1¼ to 2 in., and ¾ to ¼ in. Sand is unloaded in the same manner to a hopper, where it is stored until required.

The three sizes of gravel go to 3 storage-bins. These discharge to three 20-in. tunnel belt-conveyors which feed three jigs that give the gravel a thorough washing and remove any foreign matter. The jigs discharge to a conveyor feeding an elevator which discharges to a hopper. A tram car on an inclined track loads from this hopper or the sand hopper either for the central-mixing plant or the concrete storage-bins. The bins are in two sections, one with three compartments and the other with two. The latter are used for gravel, while the former are used for one size of gravel and the two sizes of sand. Each of these compartments feeds directly to trucks or railroad cars for shipment. When highway-specification gravel is desired, the 2-in. material is run over a Hum-mer screen which removes all material over 1½ in. in size.



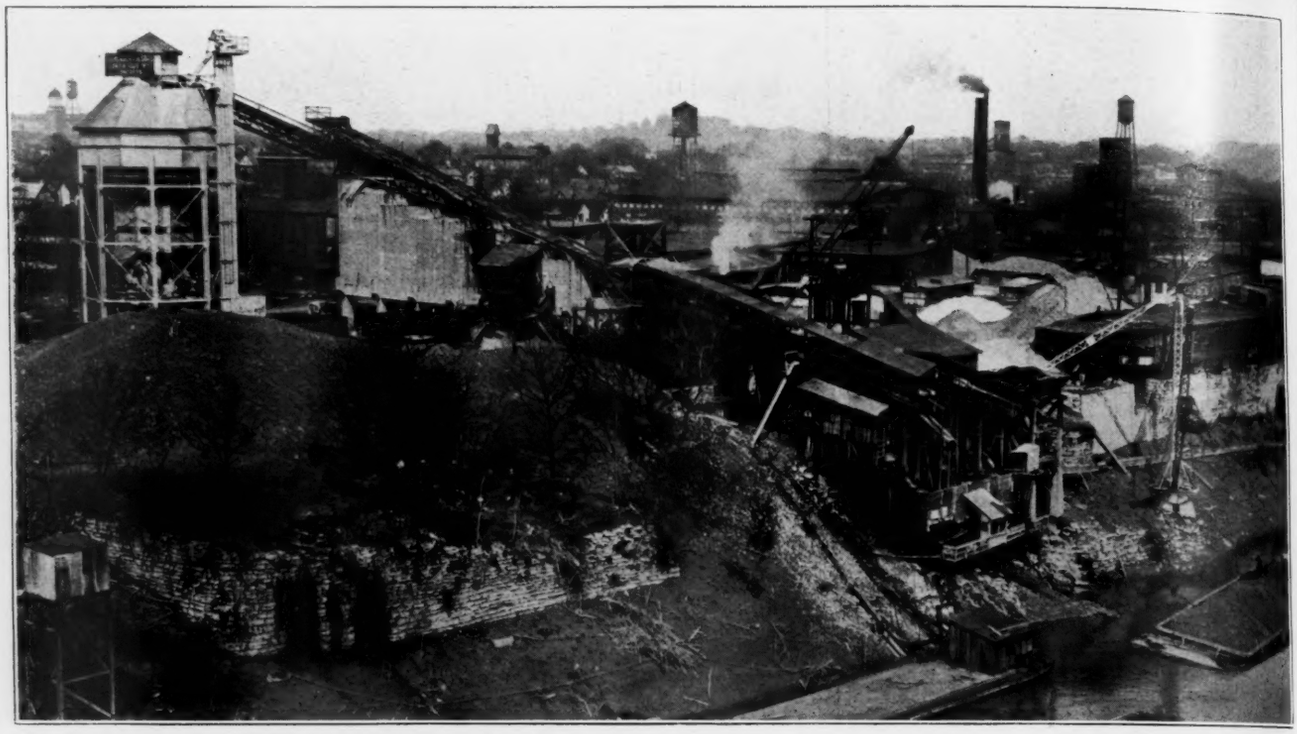
Part of the concrete storage-bins with conveyor to mixing plant above.



Close-up view of plant showing truck loading. Heating plant at left shown before it had been inclosed.

The tram car handling the sand and gravel to these bins can also discharge to a hopper which feeds an inclined belt-conveyor to the central-mixing plant. This is a 24-in. belt-conveyor on 82-ft. centers and is driven by a 20-hp. G. E. motor through a Link-Belt silent-chain drive. An automatic clutch prevents reversing of the belt under load in case of power failure. The conveyor was furnished by the Link-Belt Co. and the belting by the Manhattan Rubber Co. A movable spout, controlled by a shaft running down through the bins to the batching floor, feeds any desired bin compartment.

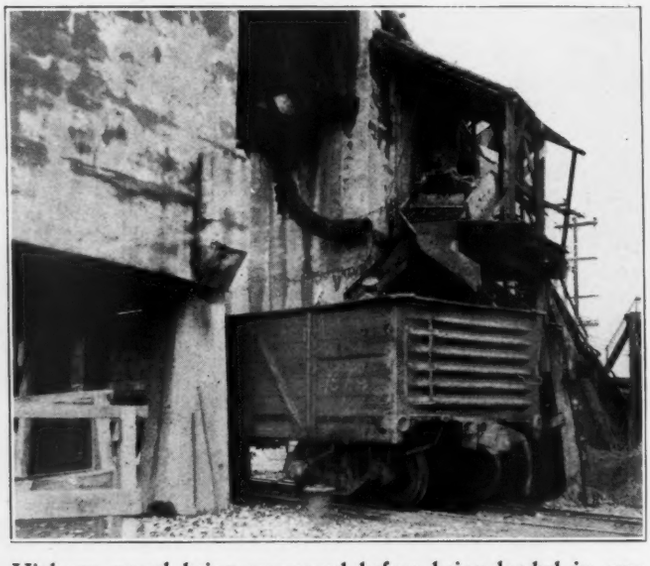
Bulk cement is used in this plant and is usually shipped in by rail. It is unloaded from the box-cars by hand through a chute leading to a concrete hopper. When cement is needed in a hurry it is hauled by truck from the plant of the Hermitage Portland Cement Co., about 1 mi. away. The trucks dump directly into the hopper. A 12-in. screw-conveyor 9 ft. long feeds the cement from the hopper to an 8-in. by 10-in. by 12½-in. steel-inclosed chain-bucket-elevator operating on 83-ft. 6-in. centers. The elevator is driven through silent chain and gear by a 25-hp. G. E. motor. The screw-conveyor is driven from the boot shaft of the elevator. A movable spout controls the discharge of the cement to any of the three compartments. Ce-



View of yards from Jefferson St. bridge across Cumberland River. Concrete plant and aggregate bins at left. Barges being unloaded to gravel plant at right.

ment is handled at night because the track is used for gravel cars in the daytime.

The control-mixing plant is of steel construction throughout and is supported on concrete footings. All the metal and all the equipment is coated with aluminum paint and presents a striking and attractive appearance. The storage-bin above the plant is octagonal in shape with a face-to-face diameter of 36 ft. One-half of this bin is divided into four equal fan-like parts used for storage of sand and the sizes of gravel least in demand. The other half of the bin is divided into two large compartments for gravel and three smaller compartments for cement. The latter occupy one face of the octagon and extend an equal distance into the two gravel compartments. The cement compartments have a capacity of 300 bbl. each and are used for Speed, Hermitage and Magnolia cements. The six gravel and sand compartments have a total live-storage capacity of 1,080 tons. Two compartments are used for sand, two for 1¼-in. gravel, and one each for ¾-in. and 2-in. gravel. One of the sand compartments is used for Tennessee River sand and one for Cumberland River sand. When crushed stone or Haydite is required these are stored in one of the 1¼-in. compartments. A sluice around the bottom of the bin drains off excess water from the aggregates.



Highway gravel being rescreened before being loaded in cars.

Looking down at gravel plant from top of aggregate-storage bins.

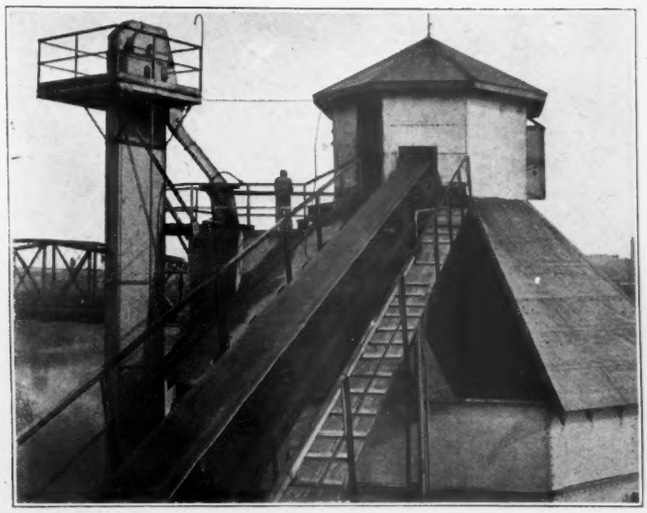
Gravel and sand are fed through six lever-controlled rotary sliding gates to a 3-cu.yd. Johnson circular weigh batcher. This has a 5-beam Johnson scale which allows each size of aggregate to be weighed by a separate beam. Each of four beams has a capacity of 9,000 lb., and the fifth of 6,000

lb. A micrometer adjustment allows accurate setting of the beam weights, and a springless beam-balance indicator dial insures speedy and accurate weighing. The batcher discharges through a rotary sliding gate, which is lever-controlled, to a spout which can feed the material to the mixer or direct to trucks for dry-batching as desired. This spout is lever-controlled from the batching floor, also.

Cement is fed from storage, through three rotary sliding gates fitted with individual lever control, a

One of agitator trucks with rear-end lift discharging at job.

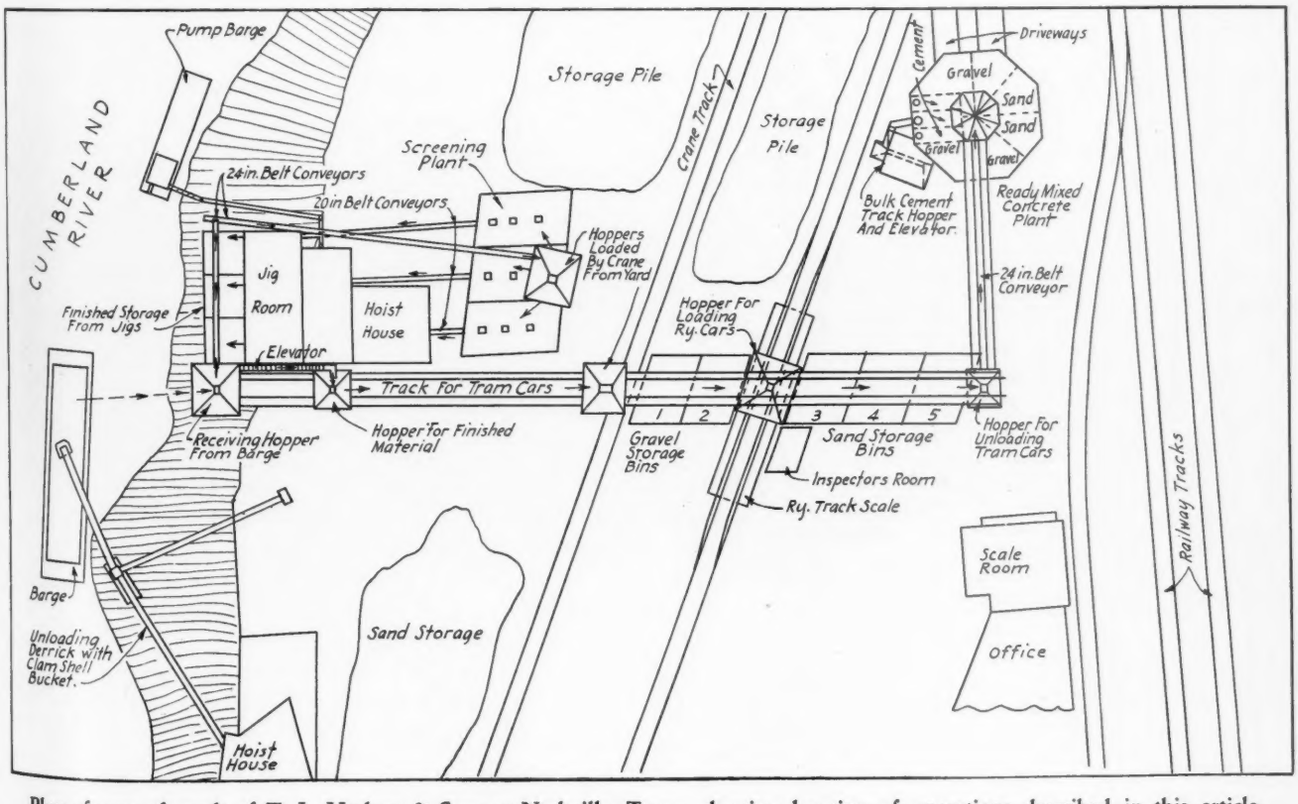
Johnson 24-cu.ft. circular weigh-batcher. A cloth jacket between the spouts and the batcher keeps the cement from spilling. Air-jets in the cement bins keep the cement from arching, air being furnished by a small air-compressor and tank through three lines. Each line has a foot valve, on which



The conveyor from the aggregate plant to mixing plant. Cement elevator at left.

the operator can step without moving from his post. The cement weigh-batcher has a 3,000 lb. Toledo springless dial scale graduated to 5 lb., and has a clock that can be used for measuring the mixing time. This batcher discharges, through a similar lever-controlled gate and movable spout, to the mixer or direct to trucks as desired.

Water used in the mix is taken from the city mains at from 110 to 120 lb. pressure to a Ransome 265-gal. siphon-type water-measuring tank. The flow of water to and from this tank is controlled by two Merco-Nordstrom valves controlled by wheel and chain by the plant operator. These valves are arranged so that one is open when the other is shut,



Plan of part of yards of T. L. Herbert & Sons at Nashville, Tenn., showing location of operations described in this article.

The fleet of six agitator trucks used for delivery of concrete.

thus eliminating any possibility of error in the measurement of the water. Regulators on the top of the tank control the amount of water measured and the allowance for moisture in the aggregate. The latter is important, as all the gravel is washed at the plant and consequently has a high moisture content. Moisture tests made at frequent intervals allow corrections to be made when a change in moisture content occurs. Gradation tests are also made at intervals to control the design of the mixes. Test cylinders of the concrete produced are made and broken regularly. All this testing is done by a testing-laboratory representative, who is on the job all the time the plant is running.

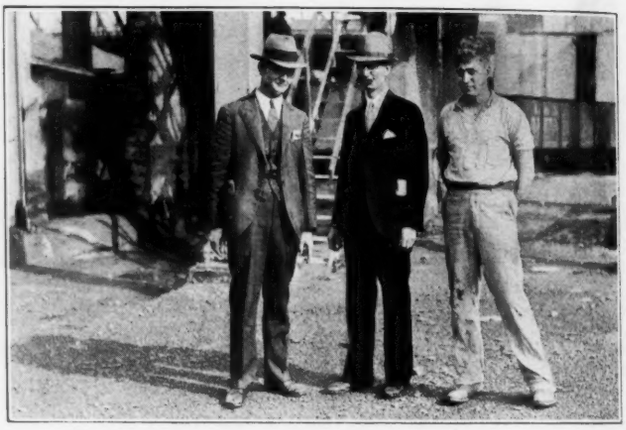
Mixing is done by a 3-cu.yd. Ransome machine, which is driven by a 60-hp. motor. A telescopic chute, which, when not in use, can be swung back out of the way, discharges from the mixer into trucks. Concrete is delivered in six 3-cu.yd. Rex Moto-Mixer bodies mounted on 5-ton GMC truck chassis fitted with pneumatic front and dual-pneumatic rear tires. The drums are rotated by LeRoi auxiliary gasoline engines and have controlled discharge gates. When agitating, the drums rotate to the right, and when discharging, they rotate to the left, rotation being controlled by a reversing mechanism which can be operated from either the front or the rear of the truck. All these trucks are

One of the portable steel hoppers furnished to users of concrete for their convenience.

equipped with Heil Jackass hoists, which raise the rear end of the body when discharging. The greater discharge height attained with this method is often a great advantage, as it allows the concrete to be chuted a greater distance. Two 1-cu.yd. Jaeger agitators mounted on Ford chassis are used for delivering to small jobs.

The delivery equipment has been found satisfactory for delivery to any reasonable distance. Concrete has been successfully delivered for country road work as much as 1½-hr. drive from the plant. The location of the plant, alongside the Jefferson St. bridge across the Cumberland River, allows rapid delivery to any part of the city without going through congested districts.

Where forms are not accessible, the company offers its customers an unusual service, which saves time and expense for them as well as for the company. This system has brought the company business which it could not previously have handled. The company has six portable steel pant-leg hop-



Left to right: C. R. Lee, superintendent; A. W. Conrad, engineer; and John Herbert, mixing-plant operator.

pers, each of 4-cu.yd. capacity, and fitted with two positive-discharge gates. These are mounted on skids and are hauled to the jobs on a specially-designed Ford truck chassis. One man can load this hopper on the truck in a few minutes, deliver it to the job, and unload it. It is of particular value to the contractor, where the concrete must be rehandled by carts, conveyors or other means to the forms, as it saves him the trouble and expense of building his own hopper. On other jobs these hoppers effect savings in truck time, as they eliminate waiting at the job. The company estimates that, where these hoppers are used, three trucks can do the work formerly done by five. The hoppers are furnished to the contractors at a nominal charge of $2, which covers only the actual cost of delivery.

For cold-weather operation the aggregates are heated by direct contact with high-pressure steam coils in each of the bin compartments, and the water by a heating plant alongside the mixer. This plant consists of a Cleaver-Brooks 60-hp. oil-fired boiler and a 2,000-gal. water-tank. There is also a Whitlock water-heater with an automatic temperature control which is set at 180 deg. F. This system is also used for the asphalt plant. Fuel oil

(*Continued on page 32*)

Abstracts of Papers Read at the Zurich Congress on Testing Materials

Concluding Series Deals with Strength, Elasticity and Workability of Concrete

THIS is the third and final installment of abstracts of papers presented at the meeting at Zurich, Switzerland, of the New International Assn. for Testing Materials. The previous series dealt with stone and cement. The abstracts herein compose the papers concerning the technology of concrete from a theoretical, practical and engineering aspect.

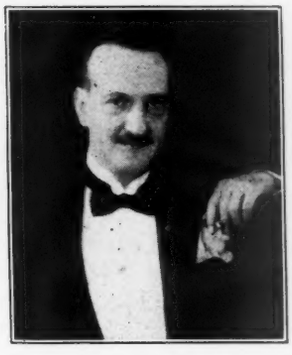
OTTO GRAF, professor at the Stuttgart Technical College, Stuttgart, Germany: *The More Important Properties of Concrete and Their Significance and Application in Practice.*

IN this report Professor Graf summarizes and discusses the more important investigations on concrete and concrete materials that have been made since the congress of the older International Association for Testing Materials at Amsterdam before the war. These are grouped under the nine headings: (1) general considerations and testing of the concrete materials—cement, sand, gravel, crushed stone, etc.; (2) the measuring and proportioning of the constituents of concrete, and the handling of concrete during mixing, transporting, and working, and during its hardening; (3) measuring the workability of concrete; (4) investigations on the elasticity and strength of concrete; (5) the permeability of concrete; (6) changes in volume due to changes in temperature and dampness; (7) preservation of concrete against weathering action and against aggressive waters; (8) generalities on methods of testing concrete, and (9) application of research data to practice.

In general, questions relating to the suitable and correct composition of concrete are giving way to problems connected with the application of research data to practical use, and to the acquisition of additional research data on the fatigue strength of concrete, on weathering action, and on the practical significance of shrinkage stresses and permanent deformation.

LUIGI SANTARELLA, professor at the Milan Polytechnic School, Milan, Italy: *Strength and Elasticity of Concretes from Italian Cements.*

THIS paper is a second report on tests carried out at the Milan Polytechnic School for the purpose of determining the influence of the quantity of cement and that of the water-cement ratio on the compressive strength and the modulus of elasticity of standard and plastic mortars and concretes. These tests used four different cements: a natural Portland, an artificial Portland, a high-test Portland, and a fused aluminous cement. Series were made up with 200 kg., 300 kg., and 400 kg. of cement, respectively, per cu. m. of product. Each series, likewise, was again made with varying percentage of water: 10 per cent., 15 per cent., and 20 per cent., respectively, of water per cu. m. of mortar or concrete. The aggregate used was the sand and gravel used commercially in Milan, with a granulometric composition close to the Fuller curve. The results of the tests carried out on specimens one year old were communicated to the Reinforced Concrete Congress held at Liege in September.



A. Pena-Boeuf.

Otto Graf.

1930, and the results of those on specimens two years old form the subject of the present report. Experiments on specimens of greater age are in progress.

The tests on the mortars and concretes made from different cements, with varying cement content and varying water-cement ratios, show a considerable variation in values. The standard and plastic mortars show that the strength of the ordinary Portland cements tends to reach that of the high-test cements as their degree of maturity increases. In concretes the strength and the modulus of elasticity increase with the age and with the decrease of the water-cement ratio. For a given granulometric composition or grading of the sand-gravel aggregate both the compressive strength and the modulus of elasticity can be expressed, for each quality of cement, by a formula as function of the water-cement ratio and of the strength of the standard mortar, with slight variations in value from the average, less for elasticity than for strength.

While reserving judgment for the results of later tests and for another granulometric composition of aggregates, it can thus be affirmed that the relations indicated, for a given mixture of materials

and for each grade of cement, make it possible to define for practical purposes, with adequate closeness and within not too broad limits, the strength and the modulus of elasticity of the concrete, once we know the value of the water-cement ratio and that of the strength of the standard mortar as determined by the standard specified procedure. In practice, using as a basis the values of the standard mortar which should always be determined as prescribed by the standard specifications, the formulæ developed here make it possible to predict sufficiently closely, for a given value of the water-cement ratio, the strength and modulus of elasticity of the concrete at each stage of maturity.

ALFONSO PENA-BOEUF, professor at the Highway Engineering School, Madrid, Spain: *Elasticity and Strength of Concrete.*

THE object of this paper is to define, by means of results from experimental investigations, the values of three constants peculiar to the physical properties of concretes and of great importance for their employment: compressive strength, coëfficient of elasticity, and the sliding action of reinforcing bars in the concrete. With the high-grade cement now on the market the permissible stress limits are often too low; the results of these investigations show that the permissible compression stress can be raised to 55 kg. per sq.cm. for ordinary concrete and to 80 and 90 kg. per sq.cm. for concretes made from high-test cement and from fused alumina cement. The modulus of elasticity of Portland-cement concrete is from 160,000 to 200,000 kg. per sq.cm.; that of high-test cement a little higher, about 210,000, and that of fused cement reaches 220,000 to 230,000 kg. per sq.cm. Poisson's coëfficient for all concretes is approximately $m = 1/7$. The sliding of bars in the concrete is the same whether the cement be Portland, high-test, or fused, from which the author concludes that the adherence of the bars is a frictional phenomenon not depending on the nature of the cementing material. The permissible stress under this head, he states, may be uniformly taken as equal to 8.5 kg. per sq.cm.

PROF. FRANK E. RICHART, B.S., M.S., C.E., Research professor of theoretical and applied mechanics, University of Illinois, Urbana: *Stresses and Strains in Reinforced Concrete Columns.*

INVESTIGATIONS described and discussed by Prof. Richart were made as regular research projects of the engineering experiment station of the University of Illinois, with results which can be briefly summarized as follows: The function of spiral reinforcement is simply to provide lateral restraint for the concrete column core which has reached a stage of plastic deformation. Under an applied load, the stress in the spiral will become just sufficient to maintain the concrete in plastic equilibrium. The relation between unit load and lateral restraint is nearly linear.

F. E. Richart.

In a new investigation of reinforced columns a cylindrical shaft, with milled ends of reinforcing bars flush with the concrete bearing faces, was adopted and used in over 300 tests. Tests of columns under rapid loading substantiate previous conclusions that column strength is a function of ultimate concrete strength, yield point stress of longitudinals and a "useful limit" stress of spiral reinforcement. Reinforced columns held under constant design load for 5 mo. shortened appreciably due to shrinkage and plastic flow. Increases as great as 14,600 lb. per sq.in. in longitudinal steel stress were noted. Flow and shrinkage effects were far greater for columns in air storage than in moist storage. After one year of sustained loading the columns are to be tested to failure to study the significance of the high initial stresses induced in the longitudinal steel.

OBERBAURAT DR. FRITZ EMPERGER, Vienna: *Alterations in Shape of Concrete under Compression.*

ALL equations previously advanced for the behavior of concrete under stress and the related researches have been restricted to the range of safe compression. In calculations relating to supporting members, however, an average value is used exclusively. There is, however, no rigid connection between statically indeterminate structures, in which elasticity is taken into account, and the majority of cases in which the calculations depend on conditions of fracture.

This problem, combined with the desirability of testing the addition law up to the point of fracture, resulted in the research on the progress of strain up to fracture reported in Communication XII of the Austrian Reinforced Concrete Commission, 1931. This first showed that the limiting strain of all types of concrete is in the neighborhood of 1 part in 1,000. On exceeding this value there is an immediate reduction in load-supporting capacity. He need not take into practical consideration, therefore, strains above that figure, nor the complete utilization of the longitudinal reinforcement No. 37, whose limiting strain is about 2 in 1,000. To indicate the progressive course of the strain, a parabola has been constructed connecting the limiting strain to fracture, the strength of a column, and the tangent at the origin. The most important problem was to follow the further course of strain to 2 parts in 2,000. It was found experimentally that the continuation at the end tangent was especially suitable for this, and offers the possibility of determining the amount of encircling reinforcement necessary for a desired strain, appropriate to the steel of the longitudinal reinforcement.

Split chute from mixing conveyor allows loading to cars or trucks. Note outlet for air-lift pump at top of plant.

The vibrating scalping screen, secondary jaw crusher and log-washer. Note concrete and steel construction.

Oklahoma Firm Adopts Unusual Method to Work Difficult Gravel Deposit

Cemented Conglomerate Must Be Drilled and Shot Before Processing Can Begin

By W. E. TRAUFFER

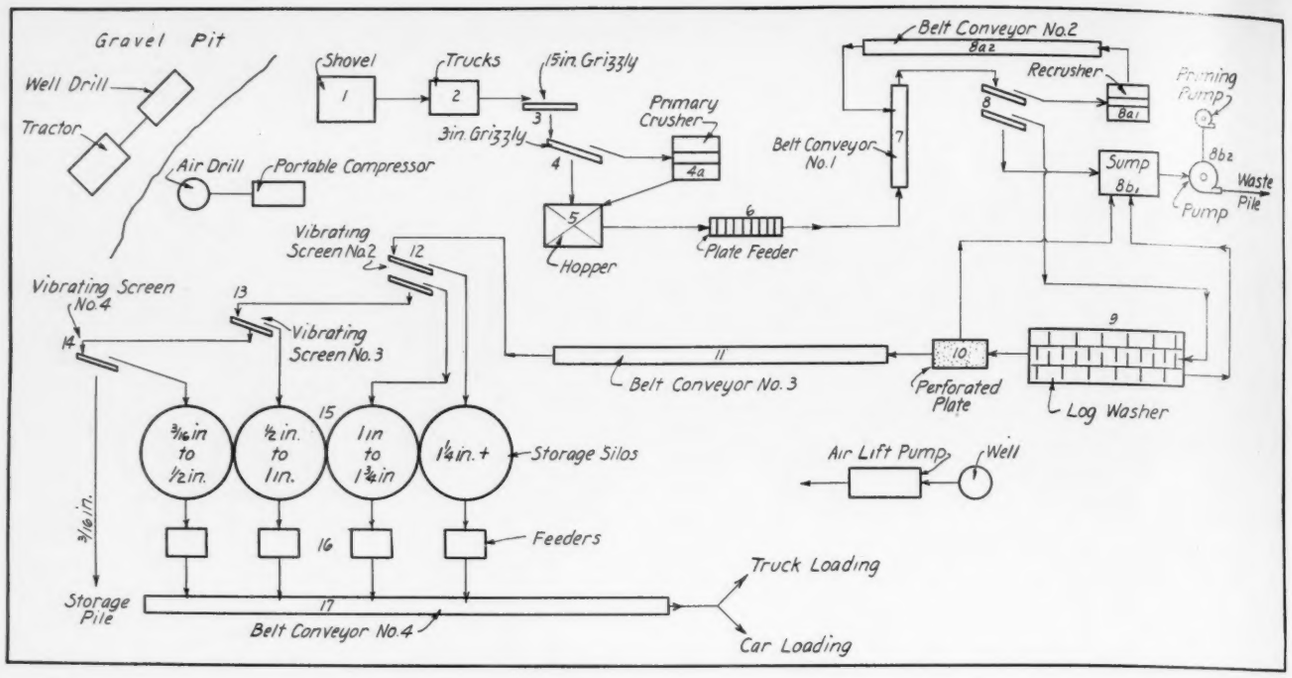
ONE of the most unusual sand-and-gravel operations in the country is that of the Makins Sand & Gravel Co. at Sulphur, Okla. This new plant, which went into operation early in July, 1931, has a gravel deposit that requires special handling methods. Unlike most of the deposits in the state which are high in sand, this one has a sand content of only about 12 per cent. It consists of a cemented conglomerate which must be drilled and blasted, crushed and thoroughly washed before it can be used for commercial purposes. About 25 per cent. of the gravel in this deposit must be crushed.

The plant is of interest because of the thorough washing system and the permanent type of construction unusual in this section of the country. The plant is entirely of concrete-and-steel construction with structural-steel plant and conveyor framework. Even the floors and conveyor walkways are of steel filled with concrete. The plant is simple and efficient in design, and production is achieved with the minimum rehandling of the material. It was designed by W. R. Davis of Houston, Tex., who also supervised its construction and the installation of the machinery. Vibrating screens are used exclusively and all the elevation of material is done with belt-conveyors.

The property owned by the company consists of a deposit of conglomerate gravel cemented together by lime. Some of the material is also in the form of loose gravel, bowlders and sand. Other conglomerate deposits are being worked commercially in the southwest, but most of these are not so firmly cemented as to require much blasting. The amount of overburden is negligible. Because of the conglomerate, it is necessary to drill and blast this material before it can be loaded. This is done with a Fort Worth spudder drill with a 6-in. bit, driven by belt from a Fordson tractor. When not in use here, the tractor is used for other purposes about the pit and plant, such as hauling the well-drill or compressor to new locations. The face now being worked is about 20 ft. in height. Due to the peculiar formation, a complete log is kept on each hole drilled, and the explosives are placed accordingly. Du Pont 40-per cent. gelatin is used in the bottom of the holes, and Du Pont Extra D higher up. Because of the shallowness of the holes at present, electric blasting-caps are used. Later the height of the face will increase to about 50 ft. as the deposit is worked farther back into the hill, and Cordeau-Bickford safety fuse will then be used. A shot which used 3,800 lb. of dynamite and loosed about 10,000 tons of material was made on April 4.

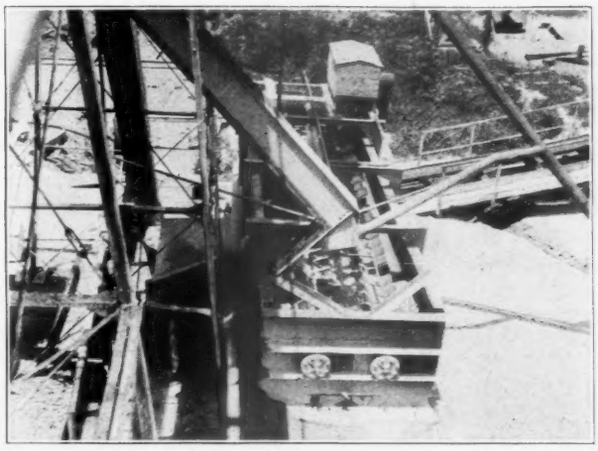
Some secondary blasting is also necessary. Drilling for these shots is done with an Ingersoll-Rand Jackhamer, air being furnished by an Ingersoll-Rand 2-cyl. portable air-compressor which is driven by a Waukesha gasoline engine. The gravel is loaded by a P. & H. Model 600 shovel which has a 1¼-cu.yd. dipper and is powered by a 4-cyl. Waukesha gasoline engine.

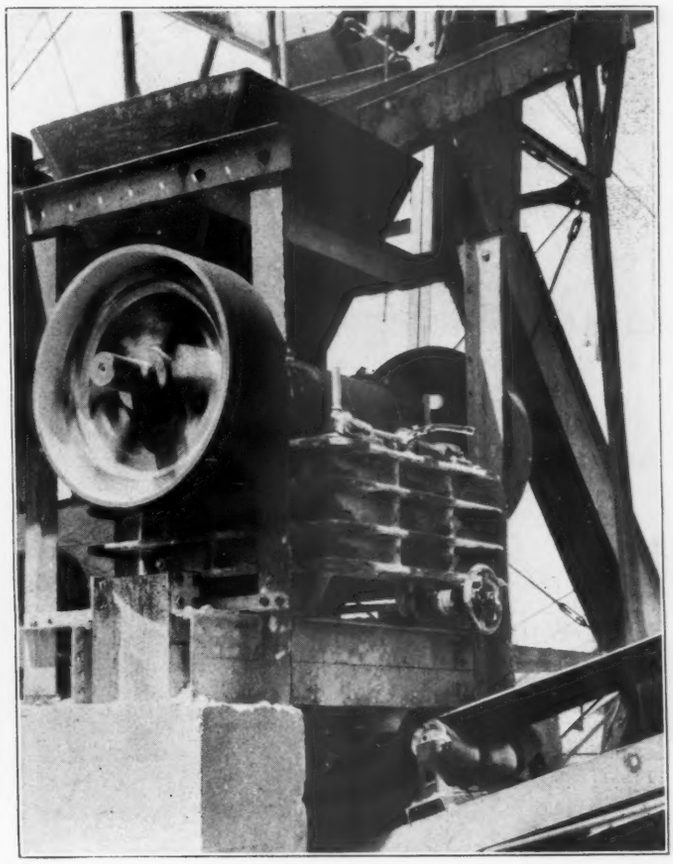
Three Diamond T 3-ton pneumatic-tired trucks haul the gravel a distance of about 600 ft. to the plant. The trucks back up a timber ramp and discharge over a 15-in. rail grizzly into the plant hop-



TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE MAKINS SAND & GRAVEL CO., SULPHUR, OKLA.
(Key numbers refer to corresponding numbers on the accompanying flow-sheet.)

Operation	Key	Equipment	Make	Model No., Size, Capacity or Type	Power Source	Power Transmission
Raw-material recovery	1	Shovel	P&H	Model 600, 1¼-cu. yd.	4-cyl. Waukesha gasoline engine	
	2	Trucks	Diamond T	3-ton		
Scalping	3	Grizzly		15-in. rail		
	4	Grizzly (Oversize to 4a; throughs to 5)		3-in. rail		
Primary crushing	4a	Primary crusher (to 5)	Diamond Iron Works	15-in. by 36-in. jaw	40-hp. Fairbanks-Morse motor	Texrope
Secondary scalping	5	Hopper		Steel		
	6	Plate-feeder	Dodge Mfg. Co.	36-in.	5-hp. Fairbanks-Morse motor	Texrope and gear
	7	Belt-conveyor No. 1	Dodge Mfg. Co.	30-in.	15-hp. Fairbanks-Morse motor	Texrope and gear
	8	Vibrating screen No. 1 (Top-deck oversize to $8a_1$; bottom-deck oversize to 9; throughs to $8b_1$)	Simplicity Engr. Co.	4-ft. by 8-ft. double-deck	5-hp. Fairbanks-Morse Motor	Direct
Recrushing	$8a_1$	Secondary crusher	Diamond Iron Works	9-in. by 24-in. jaw	25-hp. Fairbanks-Morse motor	Texrope
	$8a_2$	Belt-conveyor No. 2 (Back to 7)	Dodge Mfg. Co.	24-in.	5-hp. Fairbanks-Morse motor	Texrope and gear
Waste material handling	$8b_1$	Sump		Concrete		
	$8b_2$	Pump (To waste pile)	Amsco	4-in. centrifugal	40-hp. Fairbanks-Morse motor	Direct
Washing	9	Log-washer	Telsmith	9-ft. by 28-ft.	60-hp. Fairbanks-Morse motor	Texrope and gear
	10	Perforated plate				
	11	Belt-conveyor No. 3	Dodge Mfg. Co.	24-in.	20-hp. Fairbanks-Morse motor	Texrope and gear
Primary sizing	12	Vibrating screen No. 2 (Top-deck oversize to 1¼-in.-plus silo of 15; bottom-deck oversize to 1-in. to 1¾-in. silo of 15; throughs to 13)	Simplicity Engr. Co.	3-ft. by 6-ft. double-deck	3-hp. Fairbanks-Morse motor	Direct
Secondary sizing	13	Vibrating screen No. 3 (Oversize to ½-in. to 1-in. silo of 15; throughs to 14)	Simplicity Engr. Co.	3-ft. by 6-ft. single-deck	3-hp. Fairbanks-Morse motor	Direct
Final sizing	14	Vibrating screen No. 4 (Oversize to 5/16-in. to ½-in. silo of 15; throughs to storage-pile)	Simplicity Engr. Co.	3-ft. by 6-ft. single-deck	3-hp. Fairbanks-Morse motor	Direct
Storage and shipment	15	Storage-silos (4)		Each, 125-ton, steel		
	16	Feeders (4)	Dodge Mfg. Co.	Rotary	1-hp. Fairbanks-Morse motor	Reeves variable-speed drive
	17	Loading belt No. 4 (To truck and car loading)	Dodge Mfg. Co.	24-in.	20-hp. Fairbanks-Morse motor	Texrope
Miscellaneous		Well-drill	Fort Worth	6-in. spudder type	Tractor	Belt
		Tractor	Fordson			
		Air-drill	Ingersoll-Rand	Jackhamer		
		Portable air-compressor	Ingersoll-Rand	2-cyl. portable	Waukesha gasoline engine	Direct
		Well		8-in. by 700-ft.		
		Air-lift pump	Ingersoll-Rand	12-in. by 10-in.	75-hp. Fairbanks-Morse motor	Direct
		Auxiliary pump	Dean Hill	Centrifugal	5-hp. G.E. motor	Direct
		Water-seal pump		2-in. centrifugal	10-hp. Fairbanks-Morse motor	Direct





(Top)—The Makins plant, with scalping screen, secondary crusher and log-washer in foreground. *(In Circle)* — Tractor-driven well-drill in the pit; note massive conglomerate. *(Below)*—Secondary drilling with portable compressor supplying the air. *(Right, center)*—Looking down on the log-washer; conveyor to screening building at the right. *(Right, below)*—The secondary jaw crusher.

Shovel loading truck in pit.

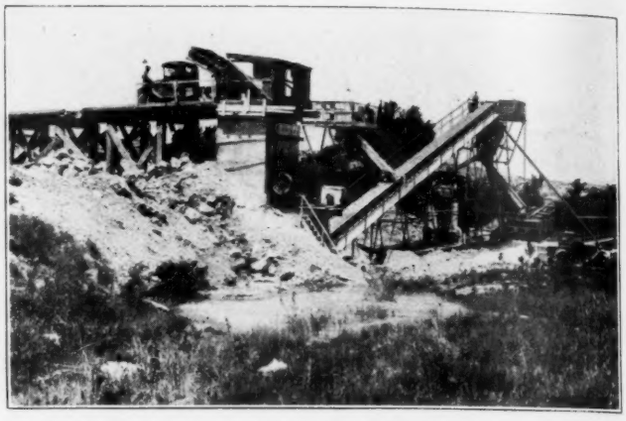
per. The material retained on the grizzly is sledged through. Below this is another rail grizzly with 3-in. spacing. The material retained on this goes to a Diamond Iron Works 15-in. by 36-in. primary jaw reduction crusher set at 3-in. opening. The product of the crusher and the material passing through the second grizzly go to a steel hopper.

A Dodge 36-in. plate-feeder discharges from the hopper to a 30-in. included belt-conveyor (No. 1).

Looking up conveyor No. 1 to scalping building. Secondary crusher and log-washer below.

A sliding gate over the feeder controls the rate of feed to the conveyor, which discharges to a 4-ft. by 8-ft. Simplicity double-deck vibrating screen having 1½-in. openings on the top deck and ¼-in. on the bottom deck. The material retained on the top deck is chuted to a Diamond 9-in. by 24-in. jaw reduction crusher which is set at 1 in. This crusher discharges to a 24-in. return belt-conveyor (No. 2), which discharges through a chute back to belt-conveyor No. 2. The material retained on the bottom deck of the scalping screen is chuted to a Telsmith log-washer, the product of which is discharged over a perforated plate on conveyor No. 3, which leads to the top of the screening-and-storage building. This conveyor is 24-in. wide.

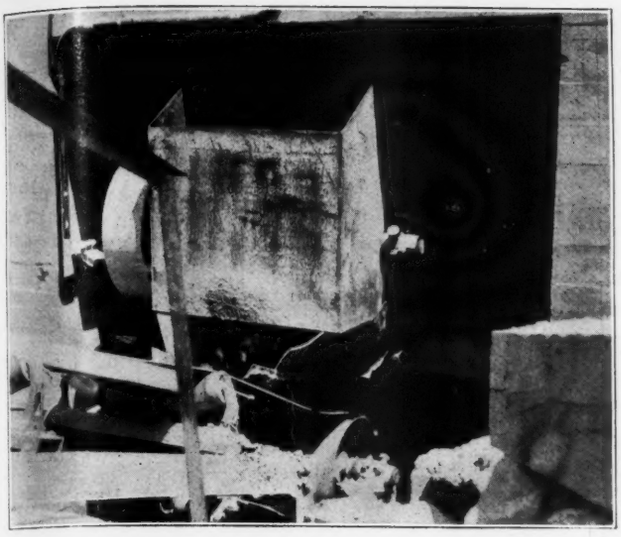
The overflow from the log-washer and the fines passing through the lower deck of the scalping screen pass to a sump. A 4-in. Amsco centrifugal pump dredges the fine material from the sump to a waste pile 400 ft. away. This pump is located in a small frame structure at the edge of the sump, and is fed through a Perfection suction hose which is suspended from a steel framework and is operated by a hand-winch.



Truck discharging to hopper which feeds primary crusher.

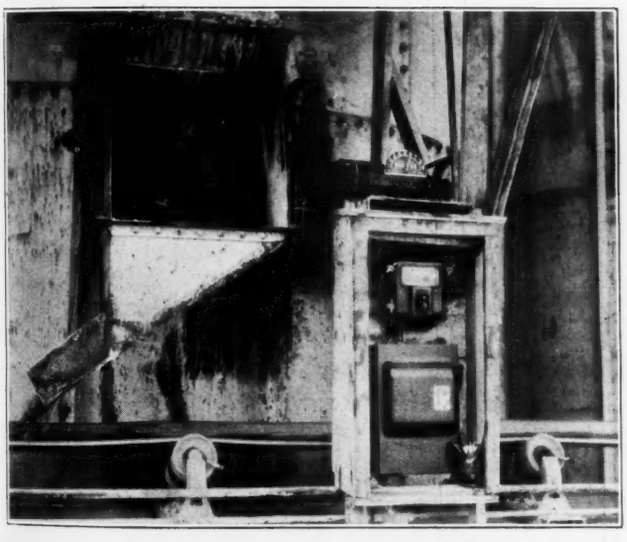
Conveyor No. 3 discharges on a 3-ft. by 6-ft. Simplicity double-deck screen with 1¼-in. and 1-in. openings. The 1¼-in.-plus material is chuted directly to storage. The 1-in. to 1¼-in. material is chuted to a second silo. The material passing through the 1-in. deck is chuted to a 3-ft. by 6-ft. screen with ½-in. openings. The ½-in. to 1-in. material is chuted to a third silo and the ½-in.-minus material to another single-deck screen of the same size. This has 3/16-in. openings. The 3/16-in. to ½-in. material is chuted to a fourth silo, while that passing the 3/16-in. deck goes by gravity through a pipe to a storage-pile near the plant. This material meets the state specifications for concrete or building sand and is rehandled and shipped whenever there is a demand for it. A cone-type sand-classifier is on hand and will soon be installed. This will allow an even closer control of the sand.

Looking down on the screening plant at two of the sizing screens.



Feeding from hopper to belt-conveyor No. 1.

Each of the four steel storage-silos which support the screening plant has a live storage capacity of 125 tons. Each is equipped with a Dodge rotary-blade feeder driven through a Reeves No. 000 variable-speed drive. These feeders discharge on a loading belt-conveyor (No. 4) and allow accurate mixing of sizes to meet any specifications. The



One of the four variable-speed feeders which feed from silos to loading belt-conveyor.

conveyor is 24-in. wide and is horizontal alongside the silos, inclining to a height sufficient to allow car or truck-loading. It discharges through a split chute to either cars or trucks by means of a flop gate controlled from the ground. The siding alongside the silos has storage capacity for 20 empty cars, which are spotted by gravity. A steel loading bin is to be installed under the truck-loading chute, so that truck orders can be filled without delay while cars are being loaded with material of a different specification.

The washing system at this plant is very thorough, and insures a clean product. The material is sprayed over each screen, in the log-washer, and is given an additional rinse over perforated chutes. The chief source of water-supply is an 8-in. well 700-ft. deep, an Ingersoll-Rand 12-in. by 10-in. air-compressor being used as an air-lift pump. To accomplish this two 5-in. pipes were extended 560 ft. down into the well, and a 1¼-in. air-line was then extended to a depth of 400 ft. between these two pipes and welded to them. The air forces the water out of the well at the rate of 800 gal. per min. and furnishes all the water for the log-washer and all the screens. A simple device, consisting of two old oil barrels welded end to end, releases the air from the water. The water and air rise through a pipe alongside the storage-silos, the water flowing through two openings in the pipe to the barrel and the air going out the top of the pipe. The barrels are set at an elevation so that they can feed all parts of the plant by gravity. This water is also used for drinking purposes. A small pond, created above the plant site, serves as an emergency supply of water, a Dean Hill centrifugal pump being available for use as an auxiliary. The overflow from this pond and any drippage about the plant go to a concrete flume, which usually discharges tc an old creek bed but can feed the sump when additional water is needed there.

The main water-line goes to the top of the screening plant and a line from that point feeds to the log-washer and the scalping screen. Perforated pipes are used as sprays.

Electricity is supplied by the Oklahoma Gas & Electric Co. at 23,000 v. This is reduced at the plant to 440 v. for all the motors and 115 v. for the lights. The plant is also wired to use a 220-v. electric welding machine, which is kept at the company's office in Oklahoma City and shipped to any of the plants as needed. Cutler-Hammer push-button switches and Crouse-Hinds conduit are used. Electric-light standards on all parts of the plant make night operation safe and efficient.

The Dodge Mfg. Co. furnished all the conveyor idlers and drives, the pan-feeder and the rotary feeders on the bins. All the vibrating screens were furnished by the Simplicity Engineering Co. All the belt-conveyors, the crushers and the log-washers are driven through Allis-Chalmers Texrope drives. Diamond Rubber Co. conveyor belting is used. All the conveyor idlers and the two crushers are equipped with Timken roller-bearings. With one exception all the motors are of Fairbanks-Morse manufacture.

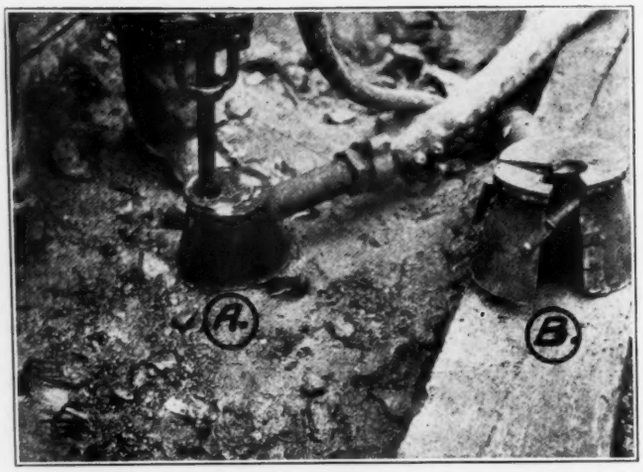
Most of the material produced is used for concrete work, paving or other type of construction. Most of the product is shipped by rail over the Frisco Ry., which is connected to the plant by a 1,900-ft. siding. Some material for local use is shipped by truck. The plant is now being operated on a basis of an 8-hr. day and a 5-day week. The present production of 75 tons per hr. is being obtained with a crew of 18 men.

The main office of the Makins Sand & Gravel Co. is at 307 Commerce Exchange Bldg., Oklahoma City, Okla. The officers of the company are: C. H. Makins, owner and president; C. J. Murphy, secretary and treasurer; E. H. Hoover, general manager and general superintendent; and R. T. Eckert, chief engineer. C. N. Deal is plant superintendent.

Trapping Drill Dust at Source Effective Means of Combating Silicosis

Kelley Device Lowers Concentration of Particles in Atmosphere to Safe Point

WITH an ever-increasing number of silicosis fatalities and disabilities reported within the last year or so, the quarrying and construction industries are directing their closest attention toward the discovery of some means to enable workmen to avoid the disease. The malady itself is not new; attempts to combat it were made many years ago on the Rand in South Africa. Drill operators and employees of silica plants are always in danger of contracting the disease. The dust inhaled with the inspired air causes certain pathological changes resulting in the formation of fibrous tissues which permanently impair the lungs and for which no cure is known. Miners, granite cutters, sand blasters, building-foundation workers—in fact, any person employed in the sand and stone industries—may come down with the disease. Thousands of dollars in damage suits filed in Illinois courts early this year served graphically to call attention to this very definite hazard.



The original Kelley trap for use with jackhammer drills. A—Trap in position for drilling; B—Trap open, showing method of inclosing drill steel.

Control of silicosis rests in the control of the dust either through its elimination at the source or by the wearing of respirators. Wet drilling has been used extensively and with considerable success, but it does not afford complete protection. Because of the difficulty of wetting the smaller particles, some dust escapes, while considerable amounts are thrown into the air when drill holes are blown out.

Four years ago the first definite step forward was made when George S. Kelley, mechanical engineer of the George J. Atwell Foundation, invented a dust-trap for use with pneumatic drills and the device was given its first real test in the excavation for the foundations of the Metropolitan Life Insurance Bldg. in New York.

The Kelley trap is a metal chamber which incloses the drill steel at the surface, looking much like an inverted water dipper without the handle. There is no mechanical seal between the trap, the rock surface, or the drill steel. Instead, an air seal is produced by vacuum, an exhaust system drawing air through the device also recovering the dust as it rises from the hole. The air flowing into the trap prevents the dust from emerging, while the suction line carries the dust away to a collecting plant. The trap, as the illustration shows, is split for easy insertion and removal of the drill steel. It is built of heavy metal so as to be able to withstand rough usage in the field. Recently Mr. Kelley announced an improvement to the trap, the new design consisting of a double-truncated metal cone, with the hole at the middle, instead of off center. This type is for use with jackhammer drills. For drifter drills a molded-rubber cone has been designed, the steel being inserted through a slot in the flexible top. A pipe arm fastened to the drill carriage holds the trap in position. A somewhat similar trap, but of softer rubber, has been developed for collecting the dust when working with stoper drills.

A central system of dust-collection was employed in the tests on the Metropolitan building excavation. The area of excavation was approximately 200 ft. square and 65 ft. deep. A steel suction main 10 in. in diameter inclosed the lot and was suspended just below the street level. At suitable intervals 6-in. branch inlets allowed flexible-hose sections to be connected to manifolds, each of which served smaller hose lines leading from ten dust-traps.

The dust-collecting plant and exhaust fan were located at street level. The dust was collected in two stages, first by the inertial type of collector which removed the larger particles, and, finally, by cloth screens which took out the very fine dust. A single-stage centrifugal air-compressor which provided the suction was located between the preliminary collection chamber and the cloth filters and was direct-connected to a 27-hp. electric motor.

As a result of the tests, the Kelley trap was shown to have reduced the dust concentration in the immediate atmosphere in the excavated area to as low as 1.1 million particles per cu. ft. A maximum of 5.6 million particles per cu. ft. was recorded. Since the standard safe concentration of dust proposed for drilling in New York State is 10 million particles per cu. ft., the Kelley trap was concluded to be a safe and efficient means for controlling the sili-

(Continued on page 35)

A view of plant with dredge line at left.

The dredge operating in the Kansas River.

Simple Dredging Plant Uses Classifiers for Producing Commercial Sand

Welch-Sandler Sand Co. Completes First Year of Operation at Kansas River Plant

KANSAS River for some distance west of Kansas City, Kan., forms the chief source of supply of sand and fine gravel for that city, Lawrence, Topeka, and the surrounding country. About 20 plants are in operation along this river within a distance of 100 mi. The river-bed deposits are fairly uniform, but get slightly finer near the mouth of the river. Most of these plants produce only sand, and very few produce material larger than road gravel. The common practice is to use flat screens for the larger sizes and cone classifiers for the smaller sizes.

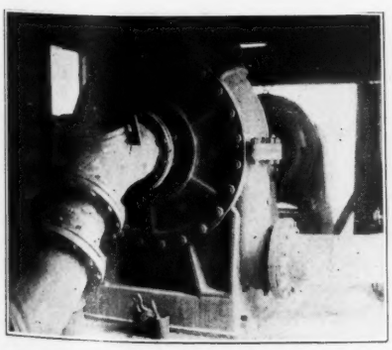
One of the newest plants on Kansas River is that of the Welch-Sandler Sand Co. It is located on the south bank of the river, south of Bonner Springs and about 26 mi. west of Kansas City. Of simple design, as are most of the plants in this vicinity, it has a structural-steel framework set on concrete footings. This plant has a capacity of about 200 tons per hr., and went into operation early in June, 1931. The river deposits at this location run about 2 per cent. over 1 in. in size and 5 per cent. over ⅜ in., and at times there is not more than 50 per cent. coarser than 28-mesh.

The company's dredge is of conventional design and construction, having a wooden hull and superstructure. The suction nozzle is held up by a timber boom, which is supported from a timber A-frame on the dredge. A special device furnished by the Morris Machine Works keeps the suction hose from buckling as the nozzle is raised or lowered. An English Bros. 3-drum hoist, driven by a 15-hp. motor, operates the nozzle and the two shore-lines.

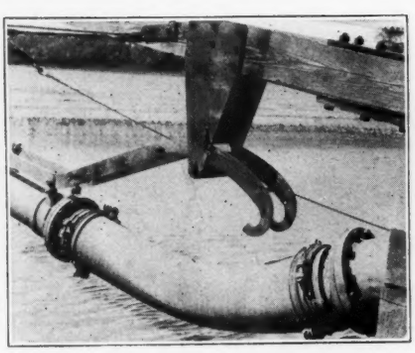
The Morris 10-in. dredge pump is driven by a 250-hp. motor. A 3-in. Fairbanks-Morse centrifugal pump, driven by a 10-hp. motor, primes the dredge pump. Manhattan suction hose and Black hose-clamps are used. The pipe-line to the plant is supported on pontoons, each consisting of two welded-steel cylinders, 3 ft. in diameter and 16 ft. long. Dressler couplings of the type used for gas- and air-lines are used on the dredge-line.

The pipe-line is elevated at the plant and discharges at a very flat angle to a sloping bar grizzly with 1¼-in. spacing. Under this is a ½-in. wire screen which is removable in sections. The ½-in.

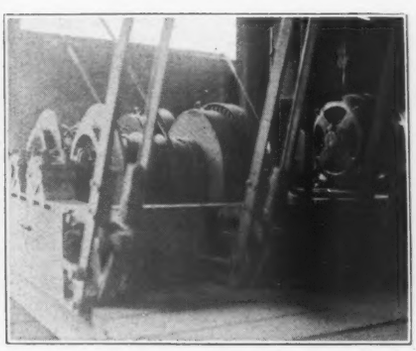
(Continued on page 37)



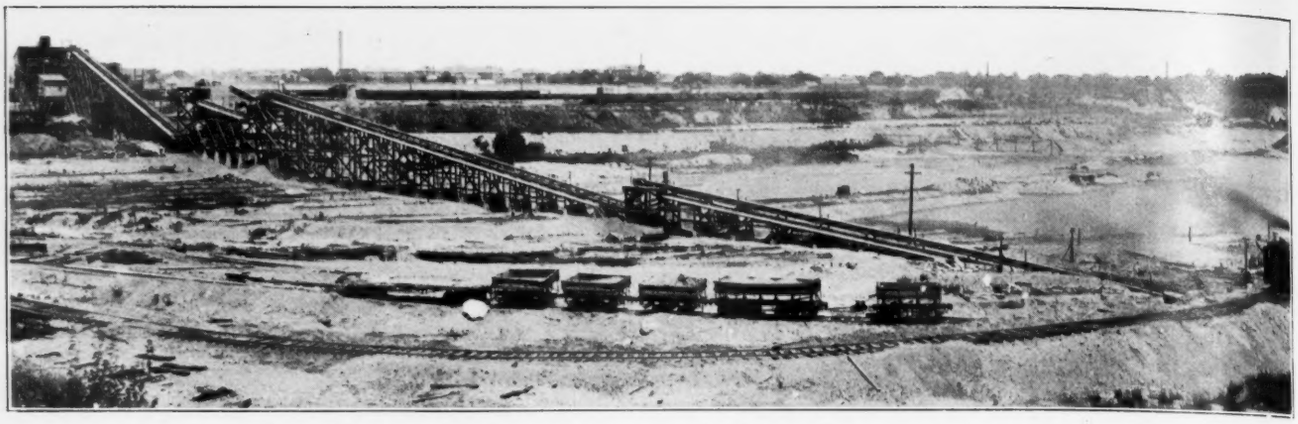
The 10-in. centrifugal dredge pump with motor in background.



Device which keeps suction hose from buckling.



The 3-drum hoist which operates nozzle and shore lines.



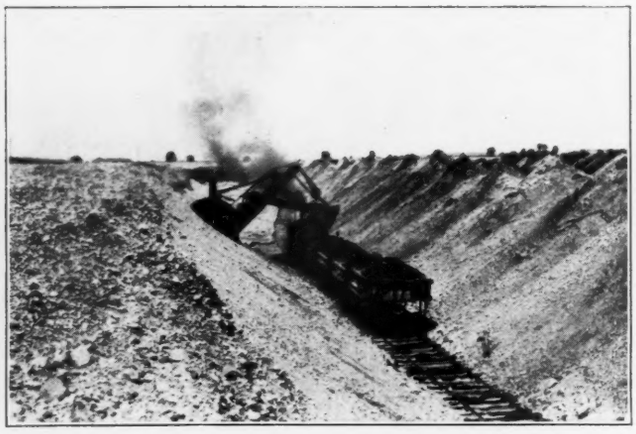
Plant, field conveyors and pit adjacent to the Purdue campus in background.

Indiana Plants Are Proving Grounds for Equipment Made by Subsidiary

Two Operations at LaFayette Part of Chain of Nine Owned by Western Indiana Gravel Co.

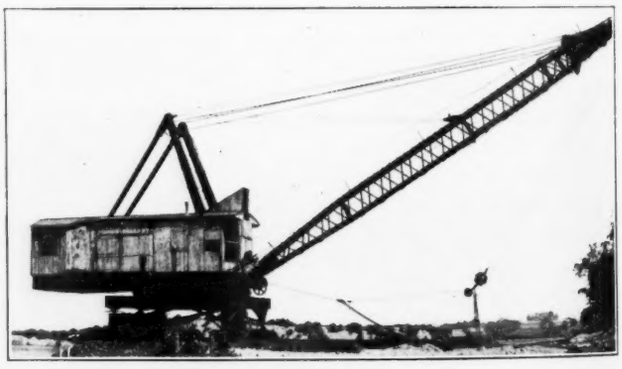
LA FAYETTE, IND., is best known as the seat of Purdue University. In the gravel industry, La Fayette, Ind., is recognized as one of the leading centers of aggregate production in the central states. Here are located the main office and two plants of the Western Indiana Gravel Co., an organization of unusual size and scope. Nine plants located in Illinois, Michigan and Indiana serve this vast territory, where hard-surface roads are the rule rather than the exception.

With nine plants in operation it is easy to understand why the company sponsors the Elwood Mfg. Co., Elwood, Ind., manufacturer of aggregate-processing machinery and plant equipment. Most of the special machinery used in the Western Indiana company plants was designed and built at Elwood, and most plant replacements and repairs are made through the Elwood Mfg. Co. The Elwood scrubber, designed to eliminate trash and mud balls under the severest conditions, was developed by Elwood engineers and has since won considerable attention in the Mid-west.



Shovel loading cars in the pit.

The two La Fayette plants, Nos. 1 and 2, are located at the outskirts of the city, within a stone's throw of the University campus. Plant No. 1 is the larger, having a daily capacity of 2,500 tons and an annual output of 2,000,000 tons. Gravel for this plant is obtained from a vast acreage of land surrounding it by means of shovel excavation in cuts varying from 2,000 ft. to ¼ mi. in length. These cuts are 25 ft. in depth, on the average. The material is loaded by a Marion No. 51 2-cu. yd. shovel



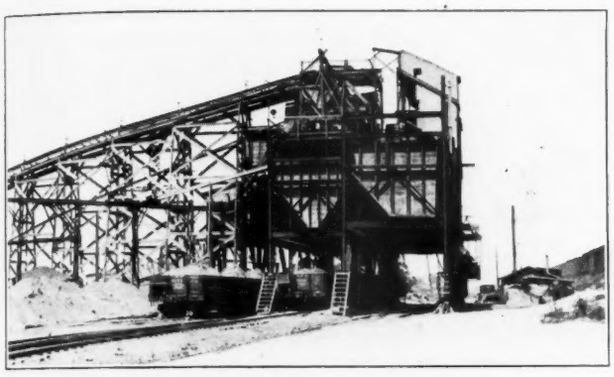
The 4-cu.yd drag-line used for stripping and loading.

or a Bucyrus ¾-cu. yd. drag-line. The latter has a double duty, as it is used in stripping operations as well as in loading. When in service, the Bucyrus machine discharges into a portable 35-cu. yd. hopper. An intraplant railway, extended along the cut, serves the hopper, and in normal operation six 6-cu. yd. Western side-dump cars are loaded from the hopper in two min.

The intraplant railway employs 50 Western cars operated in trains of six cars, each headed by a steam locomotive. There are two Porter and 1 Davenport 20-ton locomotives, and 3 American 26-ton units. When the pit is being worked by the Marion shovel, a branch of the railway is extended

in the bottom of the cut alongside the overcast stripping-dirt piles. For drag-line loading, a surface track is employed.

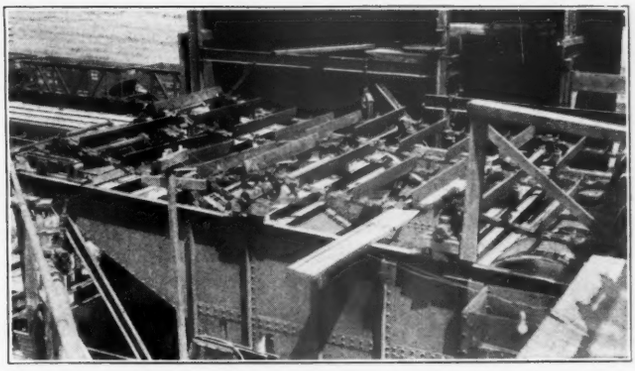
Entry for the pit-run gravel to the plant is made through a track hopper equipped with a 30-in. plate-feeder. The hopper is an unusually well-designed unit, consisting of a 20-ft. by 20-ft. concrete structure, the track being laid across its centerline to allow the cars to dump from either side. The hopper is designed to allow the use of standard ore cars which are intended for future duty. Manganese-steel fittings on the plate-feeder offer resistance to wear.



The plant from the car-loading end.

Unlike most gravel-processing plants, No. 1 of the Western Indiana company is divided into two distinct departments, each separately housed. The first department contains equipment for the initial processes, those of primary and secondary crushing, scalping, and foreign-material separation. The second department comprises the washing, scrubbing and classifying equipment located above the car-loading bins.

A series of two inclined 30-in. belt-conveyors transport the pit-run gravel from the track-hopper plate-feeder to Dept. No. 1. Both conveyors have a total length of 431.5 ft., the lift requiring 90 hp. At the head of the conveyor series discharge is made directly over a 4-ft. by 12-ft. grizzly, where plus-4-in. pieces are rejected to a No. 6 McCully crusher. Fine material passing the screen is handled by a slow-moving 48-in. picking belt. Spread in a wide ribbon on this belt, the material is readily searched by trained pickers for the removal of large pieces of ocher, *débris* and other foreign material. A Worthington 48-in. by 22-ft. double-shell revolving scalper screen receives the



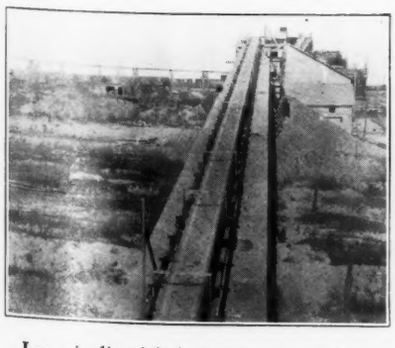
Scrubber, designed by company's subsidiary, in service at the plant.

picked raw material, separates it into three sizes, and delivers minus-1¼-in. material direct to the inclined conveyor leading to Dept. No. 2 for final classification. The revolving scalper separates the larger gravel into classes, sending them to a 36-in. Symons cone or a No. 5 Gates crusher, or to both units. The return circuit from the crushers to the scalping screen is provided by a 27-in. chain-bucket-elevator, which has a vertical lift of 45 ft. requiring a 50-hp. G. E. motor.

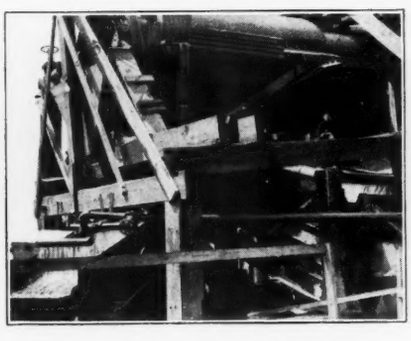
The movement of the material to the second department of the plant is made by a 30-in. Goodyear belt-conveyor, 307 ft. long on centers.

Final washing and classifying of the sand and gravel are handled by two sets of apparatus, one for the preparation of railroad ballast and the other for that of specification materials. For the ballast business, a double-jacketed 60-in. by 24-ft. trunnion screen is employed with three auxiliary Niagara vibrating screens. An inner barrel of the trunnion screen, with ⅝-in. round-hole perforated screen, separates the ballast gravel, while the slotted jackets separate the ¼-in. and ⅝-in. pebbles. This material is then handled by a double-deck 3-ft. by 8-ft. Niagara screen for separation into ½-in. and ½-in. grades. Sand is classified by passage over a double-deck 5-ft. by 10-ft. vibrating screen, fitted with ⅜-in. and ⅛-in. panels, and a 4-ft. by 10-ft. single-deck unit, fitted with a 1/10-in. panel.

State-specification materials are first sent through a 60-in. Elwood scrubber—the unit previously mentioned. This consists of a cylinder placed transversely over a compartment, similar to a standard sand-drag. Materials enter the drum, which, through its ⅜-in. round perforations, immediately removes the fines, sending them to the sand-



Long inclined belt-conveyor carrying material to plant.



Washing jets on vibrating screen. Revolving screen above.

Dennis Dwyer, chief engineer, and Supt. Chester Reigle.

drag beneath. Adequate scrubbing action is secured in the drum through a spading action sufficient to break down soft materials but not the gravel pebbles. Discharge takes place direct from drum opposite the receiving end. Gravel classification is made on a 3-ft. by 8-ft. Niagara double-deck vibrating screen. Sand delivered from the paddles of the scrubber is classified into two grades by means of a Niagara 4-ft. by 10-ft. vibrating screen.

Nine loading bins, each large enough to store 2 car-loads of material, form the substructure of the main building of the plant. The bins are arranged three in a row, each being 19 ft. by 18 ft. by 14 ft. in size. Cars are "spotted" below the bins by gravity. At the extreme east end of the No. 1 plant yard truck-loading facilities are provided in the form of a series of stock-piles, four loading bins and a track crane, the latter being an Ohio unit equipped with a 1¼-cu.yd. clam-shell bucket. The

Truck-loading hopper for local deliveries.

four bins provide for the handling of six grades of materials. Experience has proved the value of this equipment, since it separates truck traffic from the plant proper and expedites the quick movement of delivery trucks in and out of the company yards.

Unfortunately, no source of water is available at shallow depths for wash-water supply. Where other companies secure adequate water by the mere excavation of shallow pools or the damming of small creeks, the Western Indiana Gravel Co. had to dig a good deal deeper for it at Plant No. 1. Three 10-in. deep wells were dug to a depth in excess of 115 ft. and upon each well is mounted a Cook double-stroke deep-well pump. These pumps have 8-in. drop pipes with 7¾-in. cylinders and deliver water at the rate of 375 gal. per min. All three units discharge into a flume, which carries the water to a sump, where it is pumped by several centrifugal pumps to the screens. Among the latter are a 10-in. DeLaval and two 4-in. Dean-Hill units, all rated at 125-ft. heads.

Across the Nickel Plate R. R. right-of-way, which serves the two plants, is located the pit and equipment of Plant No. 2. Here an 80-acre tract of gravel land is available. Operations in the pit and plant are similar in character to those of its neighbor—Plant No. 1.

British Cement Industry Advancing, Production Census Shows

As producers of cement, Great Britain and France rank after the United States and Germany. Great Britain contributes 7.5 per cent. of the world's supply compared with 40 per cent. from the United States and 10.5 per cent. from Germany. The British cement industry is fairly centralized and the tendency toward monopolistic organization is growing. The trend of the industry is southward, with one-half of the output now from the Thames and Medway districts. A recent census of production returns shows 84 establishments in operation.

At a time when many British industries are seriously depressed, British manufacture of cement is relatively prosperous. The two largest firms have maintained dividends at 10 to 15 per cent. in recent years. Issued share capital in the industry amounts to nearly £14,000,000. The home market, which is the main support of the industry, has developed well and would seem capable of further expansion. Consumption of 156 lb. per capita compares with about 480 lb. in the United States.

The preliminary report on cement in the 1930 British census of production shows an increasing output, meeting 94.5 per cent. of the home demand. Exports amount to about 20 per cent. of the cement produced. From 1924 to 1931 the average selling value fell about 30 per cent., but improved methods have increased the per capita output of operatives.

British production of cement for building and engineering has increased 53 per cent. since 1924, the preceding census year. From 19,139,000 bbl. it advanced to 21,447,000 in 1925, 26,810,000 in 1928, and 29,448,000 in 1930. Production in 1931 has not yet been recorded.

Figures for foreign trade do not show any general trend over the same interval. Imports in 1907 are recorded at 681,371 bbl., from which they rose to 1,295,470 in 1925 and 1,645,515 in 1928. In 1930 they were reported at 1,340,902 bbl., from which they dropped to 837,094 in 1931. The annual average over the entire period approximates 1,400,000 bbl., only about 4 per cent. of present production.

Exports were recorded at 4,553,103 bbl. in 1907, 4,143,834 in 1925, 5,423,327 in 1928, and 6,195,472 in 1930, from which they fell to 3,957,805 in 1931. Considerably more than half the exports go regularly to countries in the British Empire, particularly the Irish Free State, British West and East Africa, and India. The important nonimperial buyers are the Netherlands, Egypt, Chile, Brazil, Argentina, and Persia. Exports to the United States, although comparatively small, have increased during the past several years, the highest annual shipments recorded being 199,600 bbl. in 1930.

Belgium is the predominant source of imported cement, contributing during the past five years an average of 77 per cent. of the total import each year, while the United States only averaged 30,000 bbl. a year.

Airplane view of crushed-stone operations, Weston & Brooker Co., Columbia, S. C.

The Nonmetallic-Mineral Resources and Their Value to South Carolina

By DR. LAURENCE L. SMITH
University of South Carolina

THE nonmetallic-mineral industry in South Carolina is based principally upon stone, kaolin, sand, and gravel. Phosphate rock, once an important product of this state has not been mined in several years, barite is mined at one locality, and cyanite may become important in the future.

Stone.—The value of the stone produced in South Carolina exceeds that of all other nonmetallic minerals combined. All the stone quarried in this state consists of granite and granite gneiss. In 1930 there was produced 1,391,910 tons with a value of $2,021,213. Most of this stone was crushed and used for concrete and road metal. A small proportion was used for railroad ballast and rubble. There are six quarries that have been in fairly constant operation for several years from which granite and crushed stone are produced. A few others variously scattered over the Piedmont region have produced stone at intervals.

Granite for monumental and construction purposes was formerly obtained from several quarries. For the last several years, however, only one quarry, located near Winnsboro, has produced any large quantity of such granite. Here, because of favorable location and unusually favorable structure of the rock, as well as highly desirable quality, the granite has continued to compete in outside markets as well as to furnish most of the monumental and construction stone used in the state. The granite found in many quarries is of attractive color and desirable grain, but the very closely spaced joints has often made its utilization for monumental or dimension stone impractical.

South Carolina produces no sandstone, limestone or slate.

Sand and Gravel.—With the rapid increase in highway construction in South Carolina in the past several years there has been an increase in the use of sand and gravel. In 1928 508,000 tons of sand and gravel with a value of $341,000 was produced. About three-fifths of this tonnage and two-fifths of the total value was represented by sand and gravel used for building and paving. The remainder is sand used by filter plants, for polishing, for abrasion, for glass making, and as engine sand.

Practically all the sand is of marine origin, coming from the Coastal Plain, and most from its inner margin, near the Fall Line region. Large deposits of sand of great purity and uniform grain are found here, much of it, however, being too fine for concrete to be used in building and paving. It is of excellent quality for filtration plants, abrasion and polishing, and for glass making. There are about eight pits which produced sand almost continuously for several years past.

The deposit along Wateree River, south of Camden, have produced nearly all the gravel in this state. This gravel is apparently a river deposit, having been brought down from the Piedmont region in past ages. It is of good quality, being composed of well-rounded quartz pebbles of fairly uniform size, but it requires considerable washing to remove the admixed clay. South Carolina has imported gravel from other states in past years and will be forced to do so to a greater and greater extent in the future, unless new deposits are located.

Clay.—Second in importance among the nonmetallic minerals of South Carolina from the standpoint of value of production are the clay deposits which consist almost wholly of kaolin. For several years South Carolina has ranked second in the production of kaolin, being exceeded only by Georgia.

In 1930 92,116 tons of clay with a total value of $747,620 was mined. Of this amount, 90,332 tons was kaolin and paper clay and the remainder consisted of high-grade fire-clay. Besides its use in paper, the kaolin is in demand for china-ware and as a filler in rubber, oilcloth, paint, etc.

The kaolin deposits are found in the Coastal Plain near the Fall Line. The deposits are lens-shaped with thicknesses of from 1 to 25 ft. and lengths of several hundred feet in many cases. The clay is pure white or slightly stained in shades of pink and red. It is massive and totally lacking in bedding planes. It may, in some cases, be shipped with no preparation except that of drying. In other cases, it is washed to free it of sand and silt, and the clay is accumulated in settling ponds from which it is later removed, dried, and shipped.

There are about a dozen kaolin-producing companies in the state.

Barite.—For several years barite has been mined at King's Creek, S. C. The production has amounted to several thousand tons annually until late in 1931, when the mine was forced to close because of the depressed market. The barite occurs in veins inclosed in crystalline rocks. It is mined by underground methods, and the rock is shipped as mined except for hand-sorting.

Phosphate Rock.—Phosphate rock, which was at one time a source of considerable wealth in South Carolina, has entirely dropped from the list of South Carolina mineral products. The last phosphate rock produced in this state was mined in 1925. The early supremacy of South Carolina in the production of phosphate rock led to the establishment of a large fertilizer industry in the state, and it has continued to be a large manufacturer of this product to the present day.

Cyanite.—Cyanite is known to occur in many localities in this state, notably at Little Mountain, 30 mi. northwest of Columbia, and at Henry Knob, near York. The usefulness of this mineral has only recently been recognized and thus it has not yet been extensively exploited, although known to occur in considerable quantities in Virginia, North Carolina, and South Carolina. A shipment of cyanite is reported to have been made recently from the Henry Knob locality.

Other Minerals.—Fullers' earth and asbestos are known to occur in South Carolina, though neither has been found in deposits of commercial quality or quantity. However, there is some possibility that such deposits may be discovered in the future.

This Company Gives Service When Selling Pre-Mixed Concrete

(*Continued from page 18*)

for the boiler is stored in a 1,100-gal. tank. The steam pipes are inclosed with magnesia to reduce heat loss and are electrically welded inside the bins. This heating system was designed by the company.

The asphalt plant on the same property operates under the Pre-Cote Corp. patented method of emulsifying asphalt. Most of the product is used for street and highway paving in and around Nashville. Its capacity is about 25 tons per hr.

The concrete plant was designed by the company. The C. S. Johnson Co. furnished the bins, batchers and gates, and the Link-Belt Co. supplied the elevator, belt-conveyor, and their drives. All operations are controlled from the batcher floor and all equipment is operated from G. E. controls on this floor. The plant is known as the Continuous Mix, which is also the brand name of the concrete. The capacity of the plant is from 60 to 80 cu.yd. per hr., depending on the time of mix and other factors. When dry-batching, this capacity is greatly increased.

In addition to the bin-storage there is yard stockpiling capacity for sand and gravel of about 10,000 tons. This material is handled by two steam locomotive-cranes, one of which is an American 20-ton unit with a 40-ft. boom and a 1-cu.yd. Williams clam-shell bucket. The other is an Orton 35-ton machine with a 65-ft. boom and a 1½-cu.yd. Hayward clam-shell bucket. A Fairbanks 100-ton track-scale is used for weighing car shipments. Eight trucks deliver asphalt and ten others deliver building supplies and aggregates. Truck shipments are weighed by a Howe truck-scale at the plant office. A machine and repair shop, where all work except electrical repairs is done, is maintained at this yard.

The company has a complete scale of concrete prices which include allowances for quantities, distances hauled, etc. Quantities of from 1 to 92 cu.yd. take the higher list price, and from 93 to 500 cu.yd. the lower list. Quantities of over 500 cu.yd. get an additional discount. These prices include delivery for 1 mi. and are for concrete made with 2-in. or 2¼-in. gravel. For distances of over 1 mi. additional charges are made and when smaller sizes of gravel are used there is another additional charge.

Digging for Money

PART III

By John J. Zollinger

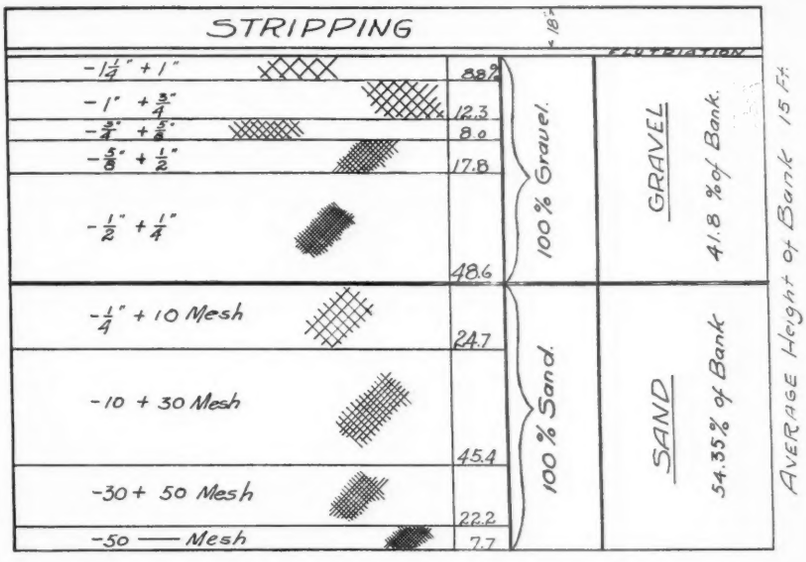


Chart showing composition of the deposit.

WE are at present passing through a business condition which will, when a thing of the past, have taught us several lessons. Economy, or rather lack of economy, is probably the fundamental cause of present conditions. Dishonesty, or lack of integrity, causes psychological reactions which are detrimental to sound, substantial business. Since the human brain certainly functions as well to-day as it did several years ago, and the average intelligence to-day is certainly higher than it was several years ago, the two stated qualities must be the root of business evil.

We practice economy when the necessity compels us to do so, and then generally at the expense of others who, by the nature of circumstances, are forced to carry our economic burden. Dishonesty, I am afraid, has deeply rooted itself, and has become, not the odious pestilence which it really is, but disguises its name in clever deals, shrewd, and ruthless business practice with self-interest the prime impetus. "Do unto others as they would like to do unto you, but do it first." We have arrived at a point where scarcely anybody trusts his neighbor. Those who have capital to invest are holding on because they distrust conditions as a whole. As a matter of fact, these conditions simply reflect the state of mind of our people. Where, in days gone by, a handshake would bind a deal irrevocably, to-day five lawyers are needed to complicate a simple thing into a maze of technical loop-holes. The almighty dollar has made us forget our better nature and turned business, which should be a fascinating, profitable education, into a scheming, nerve-wrecking competition of unscrupulous dollar-chasers.

This all may seem an erratic outburst on my part, but it actually is the truth. When political connections are used to control markets, neither the public nor progress is well served. As long as graft and hypocrisy are glaringly apparent as an example, how can the average business compete on a "square" basis? The field is open to anyone, whether his characteristics are a benefit or a detriment to the industry, and I am somewhat inclined to think that too much inherent honesty will retard individual prosperity in the present scheme of things. To my mind comes one man, who today enjoys all the luxuries wealth can buy, and I can still recall the feeling of repugnance, when on one occasion he asked me to add a certain amount more to an estimate, as his "rake-off." Multiply this incident by an unknown and no doubt very large number, and you have the "easy money" which by right belongs to legitimate business.

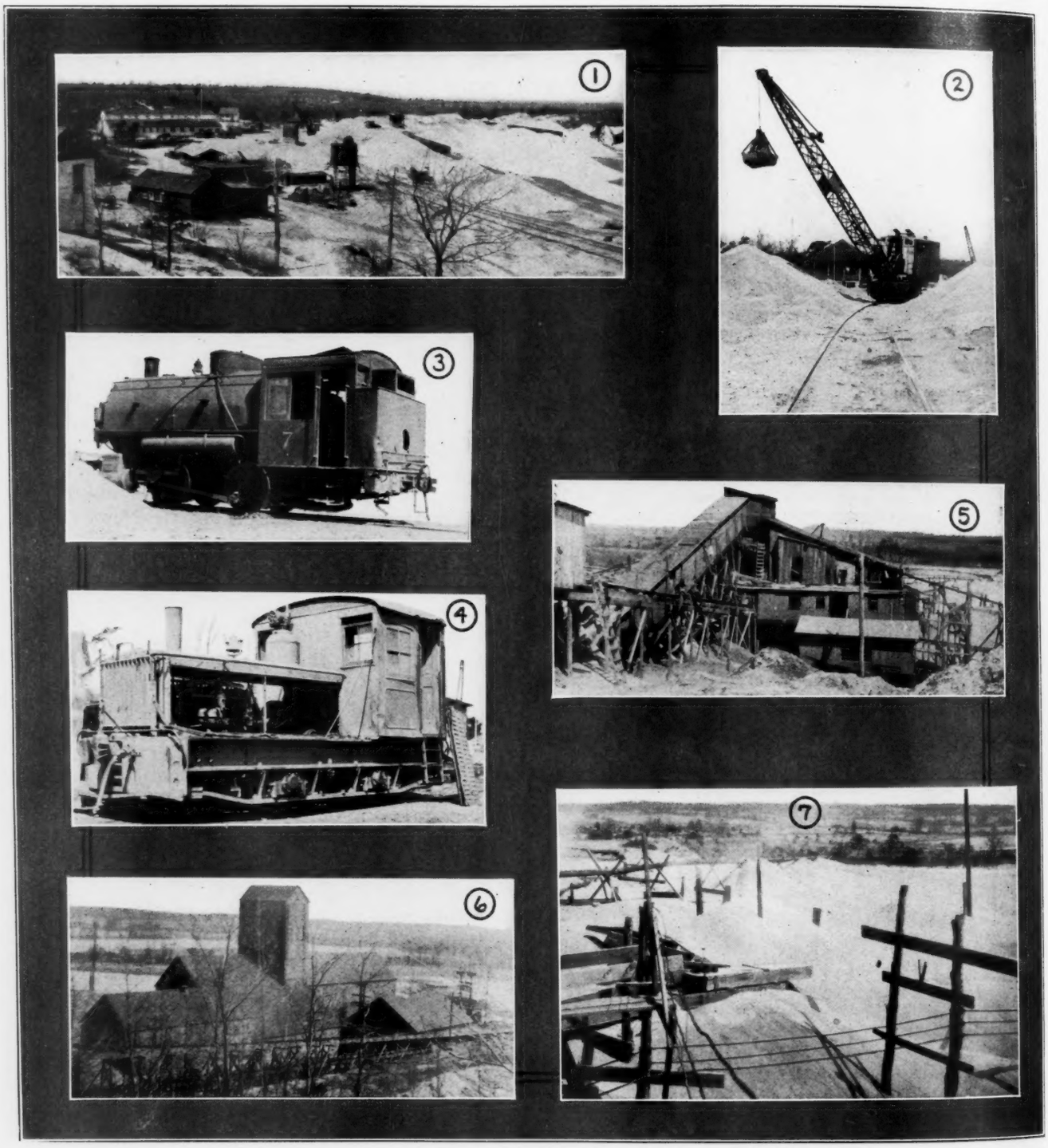
Expression of the far-reaching effect of dishonesty in business has long been in my mind, and since the plant dealt with in this article has suffered badly from just such buiness management, I feel that the remarks are not wasted. When one has seen a business founded on good simple principles grow, expand and make money, giving steady employment to many, and then sees the same business run and ruined by individuals, who, by their sublime ego, disregard all ethics, surely one holds no sympathy for them. This, however, does not detract from the interesting facts of this plant, since its present status can be wholly attributed to the above-stated qualities. With a wealth of history behind it, this is probably the first plant built in this section of the country.

The pioneer and founder is Theodore Bennet of Asbury Park, who at present has retired to a nine-hole golf-course in the quiet surroundings of beautiful country. The operation is still called the Bennet plant, and is situated halfway between Asbury Park and Farmingdale. The deposit consists of approximately 100 acres, part of which is leased on a 99-yr. term from Arthur Brisbane of newspaper fame, who has a beautiful summer home near.

Mr. Bennet's story starts in 1913, when he made up his mind to go into the road-gravel business. For this reason he acquired a piece of land situated at that time in the backwoods and surrounded by farms. He built a railroad spur to the main track, and within two years built up a business which used from 25 to 35 cars per day. The building of this business was accomplished so many years past, that the troubles and heartaches which went with it are almost forgotten, but in Mr. Bennet's memory still linger the sleepless nights and anxious days, spent over rights-of-way, leases, tricky deals, and ridicule,

that go with every new undertaking. Also, bitter memories persist of men who have bartered their honesty to gain a few dollars. His experience has taught him the fact that precious few men will stay honest, when tempted with gold.

During the operation of the first four years 7 mi. of railroad was built, a Baldwin and an American locomotive were used to haul the cars, and, since the material was loaded directly into the cars, it turned out to be an ideal business. County and town roads were being built, and the demand for this material was greater than the supply. Mother Nature, however, threw a monkey-wrench into the works in the form of sand pockets, strata which were devoid of clay, necessary for road gravel, and finally the material which could be used gave out completely. The situation looked very bad indeed. An investment of 7 mi. of railroad, locomotives, switches, and land on your books, a market ready to take the output, and then to find the material changed and become unsuited, is a situation to give plenty of food for thought. It must be kept in mind that at that time no washed sand or gravel was manufactured in this vicinity, and that this venture was undertaken solely with the idea of producing road gravel.



(1) A general view of the Bennet sand-and-gravel operations; (2) The locomotive crane; (3) Steam locomotive; (4) Gasoline locomotive; (5) The original washing plant; (6) The sand-drying plant which proved a failure; (7) The mountains of waste grits.

PERCENTAGE OF MATERIAL PASSING VARIOUS SCREENS

Size Screen (in.)		1½-in. Gravel		¾-in. Gravel		1-in. Gravel		⅝-in. Gravel		Sand	
Minus 2	Plus 1¾	Cum.	Bet.	Cum.	Bet.	Cum.	Bet.	Cum.	Bet.	Cum.	Bet.
1¾	1½	90–100	90–70	.....	.....	.....	.....	.....	.....	.....	.....
1½	1¼	.....	90–70	100	10–0	100	15–0	.....	.....	.....	.....
1¼	¾	0–30	0–30	90–100	45–25	85–100	85–75	100	10	.....	.....
¾	½	.....	.....	45–75	30–30	0–25	0–20	90–100	60–40	.....	.....
½	¼	.....	.....	15–45	15–40	0–5	0–3	30–60	30–54	.....	.....
¼	10-mesh	.....	.....	0–5	0–5	0–2	0–2	0–6	0–6	100	9–20
10	30-mesh	.....	.....	.....	.....	.....	.....	.....	.....	90	30–60
30	50-mesh	.....	.....	.....	.....	.....	.....	.....	.....	45	20–40
50-mesh		.....	.....	.....	.....	.....	.....	.....	.....	15	10–25

Just how it came about I do not know, but the fact is that in about 1917 a crude washing operation was started. This consisted of a steam boiler and a 4-in. pump. The material was sluiced over stationary screens and in this manner a separation of some sort was accomplished. Very little material could be produced in this manner, 3 or 4 cars per day being the limit. However, the demand for the material increased and the state showed an interest in concrete roads to the extent that it was decided to build a regular washing plant. Oddly enough, the site which had been least profitable in the yield of road material, now became the nucleus of the new business, and today, although the supply is almost exhausted, the old washer still stands, remodeled several times to suit changing conditions. To what extent the washed sand-and-gravel business was built up by Mr. Bennet can be judged by the fact, that the plant shipped from 35 to 50 cars of material per day.

Again the fact should be emphasized that this business was brought to the point of producing 2,000 tons per day as a matter of slow systematic progress. Nearly all the material was sold at a profit, so much so that an unlucky venture of building a dry-sand operation at a cost of approximately $100,000 did not damage the business in any way. This particular dry-sand operation is quite a layout. Since I do not think that anyone is particularly interested in this phase, I shall not describe it.

In 1927 the Bennet plant became a unit in a consolidation of four plants. At this time we find the plant still working efficiently, but the deposit pretty well worked off. Also, several things had happened in the industry. The state highway department had worked out closer specifications. The material must be clean, closely-screened, and the sand contain 10 per cent. passing a 50-mesh screen. In order to comply with these new requirements, the plant as operated heretofore could not turn cut a satisfactory product. The analysis below will clearly indicate the hardships under which a plant is forced to work in order to comply with these specifications. I have segregated the various constituents into layers, in order more clearly to illustrate the points.

Having the analysis of the raw material, let us take a survey of the New Jersey sand-and-gravel specifications which are given in the table at the top of the page.

Comparing the raw material and the specifications, it will soon become apparent that, should this plant produce state material exclusively, the burden of waste material would be very heavy. Aggregates for commercial use can be mixed within greater limits, but the market for this product is not large, therefore, to keep the production of the plant as near capacity as possible, road work will have to be considered. Again, consulting the specifications, we find four sizes of gravel defined, only two of which come anywhere near the composition of the deposit, namely 1-in. and ⅝-in. It must be understood, that it is not a case of supplying solely ⅝-in. or 1-in. gravel to a road job, but the two must have a certain ratio, as two parts of ⅝-in. to one part of 1-in. In other words, it's quite a problem and adding further to the difficulties, the sand has only 7.7 per cent. fines in the raw material so the plus-10-mesh has to be reduced sufficiently to bring the fines up to 10 per cent. In my opinion this plant ceased to be a profitable operation when it began to produce state road material. This did not become apparent at once, but, a good business man should see far enough into the future to anticipate the results of unprofitable operation. Is it not far better to run a small business at a profit, than to fool oneself with many sales made at a loss? It is something like the man who bought watches for $1 and sold them for 98 c., relying on the tremendous volume of sales he had for the profits.

At this very plant today are lying thousands of tons of grits and pea gravel which, like the proverbial white elephant, have become a burden, since they first have to be mined, run through the plant and finally disposed of at the same or higher production cost than the salable material which, when loaded, will give no more trouble.

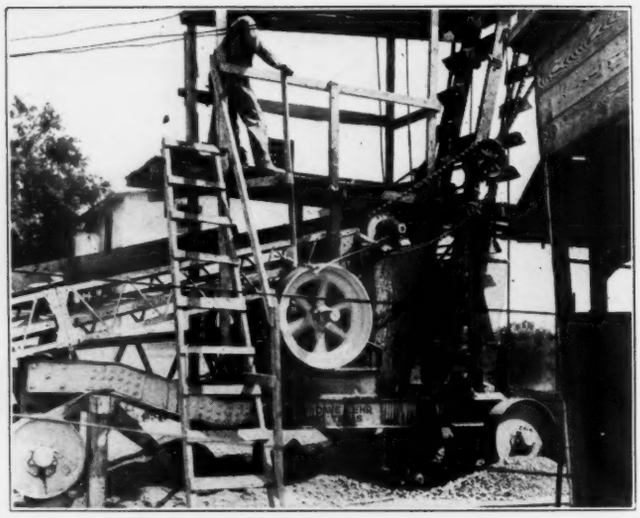
Trapping Drill Dust at Source

(*Continued from page 26*)

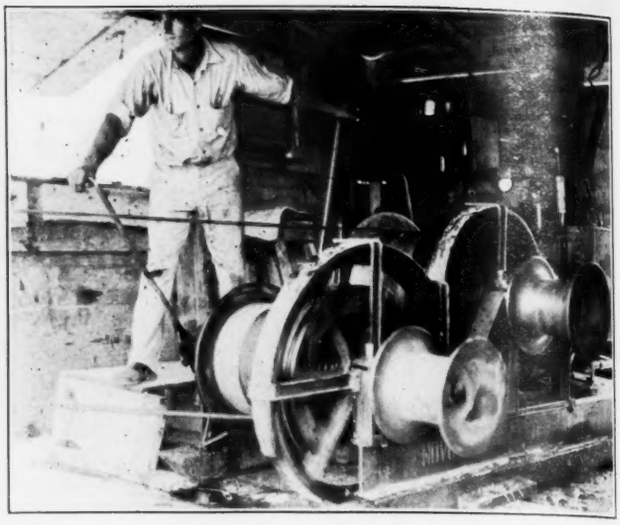
cosis hazard so far as pneumatic drilling is concerned.

The trap also enables the operator to speed up the rate of drilling. By actual test, using deadweight loads to correspond to the varying man load, it was found that the speed of drilling was increased an average of 16 per cent. This is explained by the fact that continuous removal of dust by the suction trap reduced the accumulation of the fine material under the bit and increased the efficiency of the drill.

In May of this year another demonstration with the improved type of trap was undertaken at the Rockefeller Center project in New York. Drilling was done with jackhammers, drifters and stopers and excellent results were reported, although actual figures on the dust count, with and without the traps, have not been announced.



Showing the adaptation of the portable crushing unit. Pit conveyor, left; elevator to bins at right.



Operator at controls of the two-drum hoist used to operate the drag-scraper in the pit.

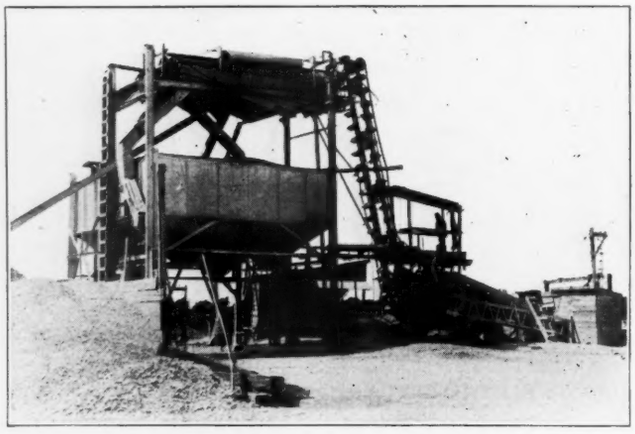
Portable Plant Forms Permanent Unit of Gravel Operation in Texas

AN interesting application of a portable crushing plant is the operation of the Woodlawn Gravel Co., near San Antonio, Tex. The plant is owned by Dave Lehr (of San Antonio), who operates a number of portable crushing and screening plants in Texas to supply aggregates for highway-construction work. This unit, however, is intended to be a permanent operation to supply aggregates for the rapidly-growing residential section west of San Antonio. The plant is located in Woodlawn Hills, 6 mi. west of the heart of the city, and went into operation early in 1931.

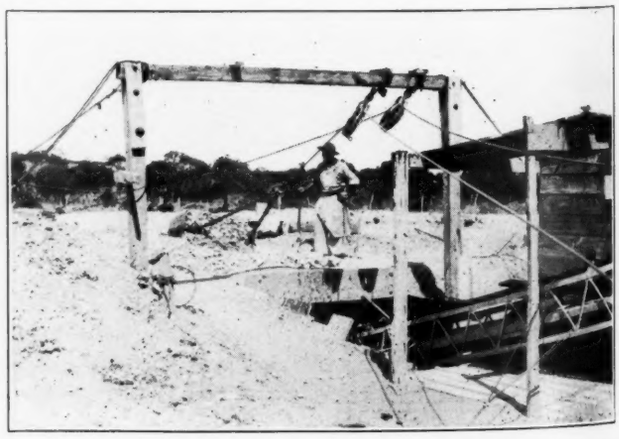
The property on which operations are being conducted consists of 150 acres of gravel deposit with very little overburden. It runs about 20 per cent. sand and the gravel is well graded to a depth of about 25 ft. Below the gravel is a layer of large bowlders under which is solid rock.

A ½-cu.yd. Cedar Rapids drag-scraper excavates the material and discharges it to a hopper which is at the plant and has a grizzly to remove oversize. The scraper is operated by a Novo 2-drum hoist driven by a 25-hp. G. E. motor. The hopper feeds the short inclined belt-conveyor which is a part of the portable crushing unit. This discharges over a 2-in. bar grizzly to the 9-in. by 24-in. Cedar Rapids jaw crusher. Both the material passing through the grizzly and the product of the crusher are discharged to a chain-bucket-elevator which is also part of this unit. The elevator frame is hinged so that the elevator can be folded back when the unit is being moved and the conveyor is in sections that can be readily taken apart. The crusher is belt-driven by a 50-hp. G. E. motor which also drives the elevator and conveyor by chain.

The bucket-elevator discharges to a 3-ft. by 20-ft. revolving screen on the top of the steel bin-structure, which is a separate unit from the crushing plant and must be taken down before it can be moved. The main barrel of this screen has a 4-ft. scrubber section, an 8-ft. section with ½-in. perforations, and a 4-ft. section with 1½-in. perfora-



Plant view. Crusher and scraper house at right.



Drag-scraper discharging to conveyor hopper.

tions. The ½-in. section also has a wire-cloth sand-jacket. The two sizes of gravel and the sand produced are chuted to a 4-compartment steel bin, which has a total capacity of 80 cu.yd. Oversize is chuted to a short belt conveyor which feeds back to the crusher. Both the conveyor and the screen are chain-driven from the crusher motor.

Arrangements are also made so that any size can be chuted to stock-piles. The stock-piled stone is distributed by a slip-scraper which is of the type used in excavation work and is drawn by a truck. Waste water and sand from the screen are flumed to a wooden settling tank in the ground alongside the plant. This settles out the concrete sand. As there is very little foreign matter in the deposit the sand is clean enough to pass any local specifications. Trucks are loaded through sliding gates under the bins or direct from the stock-piles. Sand is loaded direct from piles alongside the settling box.

The plant has a capacity of 200 cu.yd. per day and was furnished complete by the Iowa Mfg. Co. of Cedar Rapids, Ia.

Dredging Plant Uses Classifiers in Producing Sand

(*Continued from page 27*)

screen is used when heavy sand production is desired, and as fine as 6-mesh is used when road gravel is the principal product. The material retained on the grizzly is chuted to a waste pile. That retained on the bottom screen is road gravel and is chuted directly to cars. The material passing through the screen goes through a steel flume over the loading track, where the feed is split to two Wood Auto-Vortex No. 6460 classifiers. These are 5 ft. 4 in. deep and 5 ft. in inside diameter. Both classifiers at present produce concrete sand with a fineness modulus of approximately 3.6 to meet state specifications.

The overflow from these classifiers goes through a steel flume past a third classifier. A valve that can be regulated to divert as much material as desired feeds through a ½-in. wire screen to the classifier. This produces a very fine grade of sand which averages about 95 per cent. through 18-mesh and not over 5 per cent. retained on 100-mesh. This can be varied to meet specifications for masons' or engine sand. The overflow is wasted.

Of the two sizes of sand produced only one can be loaded into cars at a time. All excess materials are stock-piled and later rehandled to cars by a small crawler crane. A Sterling Machinery Corp. hoist, driven by a Continental gasoline engine, is used as a car-puller. The steel plant structure was furnished by the Kansas City Structural Steel Co. All other equipment except the classifiers was sold by the English Bros. Machine Co. Cutler-Hammer electrical equipment is used exclusively on the dredge.

Complete Report on the Addition of Sugar to Lime-Sand Mortars

In response to requests for additional and complete information regarding the report of Gerald J. Cox and John Metschl, fellows of the Mellon Institute of Industrial Research, regarding the use of sugar in lime-sand mortars, the complete report is appended hereto. Messrs. Cox and Meschl made the report at the meeting of the American Chemical Society in New Orleans, La., on March 29, 1932, and it was summarized in the April 20, 1932, issue of PIT AND QUARRY. The report follows:

Among the direct applications of sucrose, we have considered the ancient use of sugar in lime-sand mortar to be the most promising for a successful use of large amounts of sugar. Mortar possesses certain qualities of workability that are superior to cement mixtures or gypsum plasters, but it is lacking in strength. Lime mortar can regain many of its former uses if its strength can be increased.

Our experiments to date have consisted of tests of tensile strength of lime-sand mortar with and without the addition of cane sugar. We have made briquets in molds meeting the A. S. T. M. specifications and have determined the average tensile strength of ten briquets in each group after seasoning in the laboratory for six months.

The mix which we employed was as follows: Lime putty was made by mixing 1 part of quicklime and 2.75 parts of water by weight. The lime putty was then aged at least 24 hours, but generally much longer. The experimental amount of sugar was next added in 0.25 part of water and 3 parts of 20-30 mesh standard Ottawa sand. The molds were filled at once.

No variation was made in these proportions. The sugar content was varied from 0 to 12 per cent. of the quicklime in 1 per cent. stages. The briquets were removed from the molds after 48 hours, with the exception of those containing 9 per cent. sugar or more. These latter mixtures were progressively more fluid than those of lower sugar content and required longer drying in the molds. We believe a reduction in the proportion of water would have stiffened these mixtures to the same consistency as the controls, without materially altering the final tensile strengths. A further series of tests is planned in which a constant consistency will be maintained.

Variations of tensile strength occurred, particularly in some of our early mixes, owing, we believe, to improper slaking of the lime and perhaps to variations in the final mixing. Our data, however, point definitely to an increase of about 60 per cent. in tensile strength with the addition of sugar amounting to 6 per cent. of the quicklime.

From the recommendations of a few correspondents and the descriptions in scattered references in the literature, we believe mortar containing sugar is superior in all ways to ordinary lime-sand mortar. We are continuing our studies in all aspects of the problem, with all speed consistent with reliability. On the basis of the experiments we have completed, we recommend the addition of 6 pounds of sugar per 100 pounds of quicklime, or 4.5 pounds per 100 of hydrated lime. The lime must be slaked and cool before sugar is added. The proportions of sand and water may be varied as desired.

We also plan experiments with various plaster mixtures, including gypsum and cement.

The above description of our work and also our recommendations apply only to lime-sand mortar. Our search of the literature has revealed about seventy reports on the effects of addition of sugar to Portland cement. The authors are unanimous in their findings that cane sugar ruins concrete made from Portland cement and must not be used.

Power-Factor Investigations Simplified

By R. H. ROGERS
Industrial Engineering Dept.
General Electric Co.

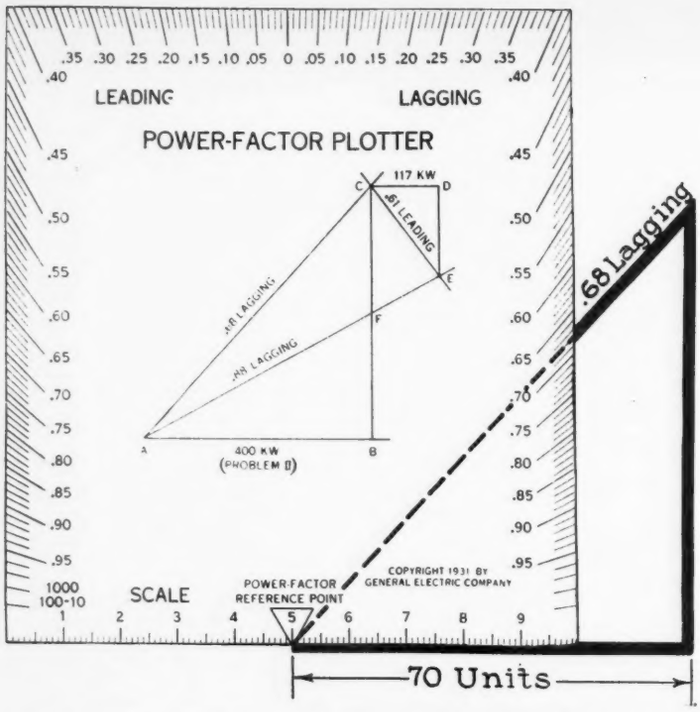


Fig. 1. The power-factor plotter, suggested for use in the simplified solution of power-factor problems.

AN exhaustive study of a given power-factor situation, in order to compare many possible ways for improvement, would ordinarily involve a great number of computations along carefully thought-out lines. These computations do not come as easily as they once did for most of us, and besides, there are many in positions to suggest power-factor improvements who are not familiar with trigonometrical tables, or with substitute methods of figuring such matters. The graphic method, making use of a recently devised plotter has the advantages of making the problem visible, avoiding errors, and suggesting expedients that never would occur to one through a maze of figures. The power-factor plotter illustrated in Fig. 1, together with the folder giving ten practical problems and their solution, will be found very helpful in all plants using alternating-current power. Before going into the details of solutions by this method, an explanation of power-factor and the desirability of improving it may be in order.

Current and voltage *in phase*, representing actual power in watts or kilowatts, is registered at the meter and paid for. Sufficient capacity in conductors, whether in the generators, transformers, transmission lines or distribution systems, is provided to keep the temperature rise and the voltage drop within predetermined limits. When the total kilovolt-amperes (kv.-a.), the apparent power in the system, is the same as the kilowatts (kw.), the actual power, the power-factor is said to be unity. That is:

$$\frac{kw.}{kv.\text{-}a.} = 1.$$

There may be current in the system that is *out of phase* with the voltage wave and can therefore do no work. This *"wattless" current* or *"reactive kv.-a."* may lag behind the voltage wave or it may lead the voltage, and is called *lagging reactive kv.-a.*, or *leading reactive kv.-a.* respectively. The presence of either in a circuit increases the total kv.-a. without affecting the kw., the meter or the power bill directly. *Reactive kv.-a.* takes energy from the system and returns it every half wave, thus it does not call for any new energy. It is like the tide which ebbs and flows periodically.

Where reactive kv.-a. is present the total kv.-a. is increased thereby, but the kw. is not, and $\frac{kw.}{kv.\text{-}a.} =$ less than 1. The ratio or per cent. obtained by dividing *kw. (actual power)* by *kv.-a (apparent power)* is called the *power factor*. It will always be less than unity if there is either lagging or leading reactive kv.-a. in the circuit. The total kv.-a. *is not the sum* of the actual power and the reactive kv.-a. but it *is the square root of the sum of the squares of the two (usually called components)*. There have been many analogies proposed, but the most satisfactory is the right triangle. The base is *kw.*, the vertical is *reactive kv.-a.*, and the hypotenuse is *total kv.-a.*

The Woes of Low Power-Factor.—Where a reasonable power-factor, say .85 or .90, is considered in the circuit make-up, changed conditions may reduce the power-factor and increase the system heating and the voltage drop. If often occurs that no more load can be added to a circuit, however desirable that may be, because the wattless current has overloaded the system. By improving the power-factor more load can be added at a much smaller over-all expense than would be incurred by introducing more copper or more circuits.

Low power-factor conditions in a plant produce low voltage, excessive voltage dips upon overloads, and peaks. Motors are robbed of starting and running torques in proportion to the squares of the voltages. Motors start loads slowly or are unable to start, and voltage dips stops motors through the

action of the under-voltage protective device. The slip of induction motors is greater at reduced voltage, hence production suffers because the motors are not up to normal speed. These are some of the reasons for improving the power-factor to improve operating conditions.

The central-station companies must provide copper in their generators, bus bars, transformers, transmission lines and local transformers to carry the wattless current emanating from their customers' plants. This current does not register on the

Fig. 2.

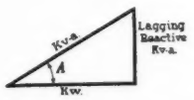


Fig. 3.

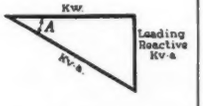


Fig. 4.

watt-hour meter, and without some power-factor clause in the power contract, two customers, one having unity power-factor and another having .65 would pay the same amount for service. To equalize matters it is common practice to subtract from the total kw.-hr. certain percentages for high power-factor and to add to the kw.-hr. certain percentages for low power-factor, or in other ways penalize low power-factor. A common plan is to deduct ½ per cent. for every 1 per cent. that the power-factor is above .85 and to add a like amount for each per cent. below .85.

In some cases the "bonus" may be 10 to 12 per cent. at unity, 0 at .85, and a "penalty" as high as 15 per cent. for a power-factor of .70. Some companies reserve the right to withdraw service if the power-factor falls below .50. It is very essential

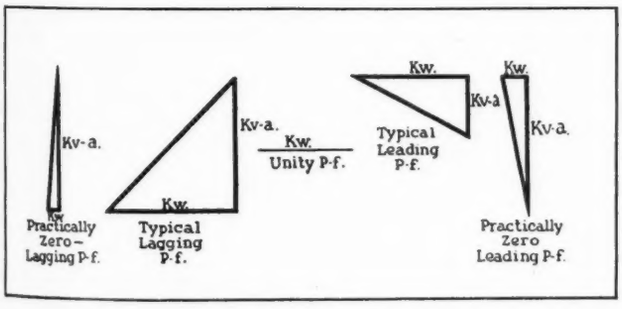


Fig. 5.

that this feature be considered, for the difference between, say, .75 and .90 power-factor might well be $1,500 on each 1,000,000 kw.-hr. used, *i.e.*, on each 400 to 500 horsepower used 8 hr. per day for a year.

Wattless current requires just as much copper in all parts of the circuit as is required for a like amount of working current. A circuit that is laid out for a 5 per cent. voltage drop with only the working current (unity power-factor), will have an 8-, 12- or a 15-per cent. voltage drop according to the amount of reactive kv.-a. or wattless current that is swashing in and out of the circuit every time magnetization takes place, *i.e.*, every half-cycle.

The following tables show the effects of low power-factor on the energy-carrying capacity of copper: For a given load at any given time there is required:

1,134 lb. copper	at unity	power-factor
1,400 lb. copper	at .90	power-factor
1,772 lb. copper	at .80	power-factor
2,320 lb. copper	at .70	power-factor

While a given amount of copper will carry:

2,000 hp.	at unity	power-factor
1,800 hp.	at .90	power-factor
1,600 hp.	at .80	power-factor
1,400 hp.	at .70	power-factor

Fig. 2 shows the relative amounts of copper in bus bars for the same kw. at .60 and at unity power-factor.

Power-Factor Computations.—Fig. 3 shows a typical diagram for lagging power-factor. Fig. 4 shows a typical diagram for leading power-factor. The ratio of kw. to kv.-a. changes the same as the cosine of the angle *A* between them changes, that is, it is 1 when there is no angle (unity power-factor and all kw.) and it is 0 when the angle is 90 deg. (all reactive kv.-a.). For 45 deg. it is .707 and not .5 or 50 per cent., as might be expected.

Every individual power-factor condition may be represented by a right triangle, or if unity or 0, by a straight line. Fig. 5 shows typical diagrams for power-factor conditions.

The utility of the graphic method becomes apparent when it is noted that the diagrams can be coupled together for two or more loads and the over-all power-factor can be read directly. Further, it makes no difference in what order the load diagrams are combined.

Fig. 6 exhibits a combination of lagging, unity and leading power-factor loads.

Leading power-factor by itself is just as undesirable as lagging power-factor, but leading reactive kv.-a. can neutralize lagging kv.-a. and improve the power-factor, for which use it is highly desirable. Increasing the kw. without increasing the kv.-a. improves the power-factor, hence it may not be necessary to introduce any leading reactive kv.-a. or an increase in kw. can be combined with some leading reactive kv.-a. to get the desired effect. It is difficult to carry all these possibilities in mind while making calculations commonly used, and for this reason the power-factor plotter was devised.

We will now take up the power-factor plotter and its use. The plotter, Fig. 1, is a 4-in. by 4-in. Bris-

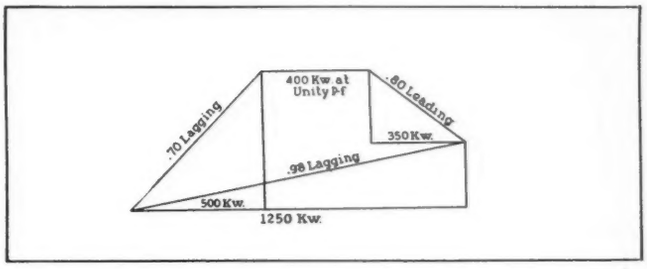
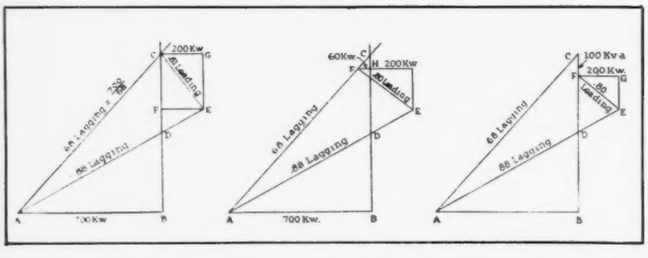


Fig. 6.

tol-board card. Along the bottom edge is a decimal scale from 1 to 10 which may, of course, represent units, tens, hundreds, or thousands, according to the magnitude of the values involved. This scale is used for laying off in a diagram the known values and for measuring the unknown values. This can be applied to any line to lay off or determine a value. Angles are drawn on the plotter to represent power-factors from 1 to 0 both leading and lagging. There is an angle for each point, *i.e.*, .99, .98, .97, .96, etc. These angles are used for laying down known power-factors and for reading resulting power-factors after the diagram is complete. This enables every angle to be laid off or measured, with the pivot or angle point at the point 5. As already stated, every condition can be shown by a scale triangle or straight line. Every combination can be shown by adding one diagram to another and reading the over-all results.

Now there are several ways in which the power-factor can be improved. The costs will vary and after the several ways are plotted costs under local conditions can be determined, savings and costs compared, and the best method can be selected. Among the means are substituting high-speed induct on motors for low-speed units, fully-loaded motors for under-loaded ones, substituting unity or leading power-factor synchronous motors, applying capacitators (static condensers) or synchronous condensers, adding or substituting other unity pow-



Figs. 7, 8 and 9. Graphical solution of several methods of correcting low power factor in a particular problem.

er-factor loads, such as lights or resistance heating units. It may be expedient to use several of these means to attain the desired results to the best advantage.

As we have space for demonstrating only one problem we will investigate several methods for attaining the new end.

Given: A 700-kw. load at .68 lagging power-factor, which is to be improved to .88 lagging power-factor, taking advantage of added load, without increasing the system heating or voltage drop (keeping total kv.-a. the same).

Draw *A B C* (Fig. 7) to represent 700 kw. at .68 lagging power-factor. Draw *A D* at the .88 power-factor angle and extend it to *E* to equal *AC, i.e., A E* represents the same total kv.-a. as *AC*. Measure *EF*, which shows that 200 kw. can be added without increasing the heating or voltage drop. Now to find a way to improve the power-factor to get this advantage.

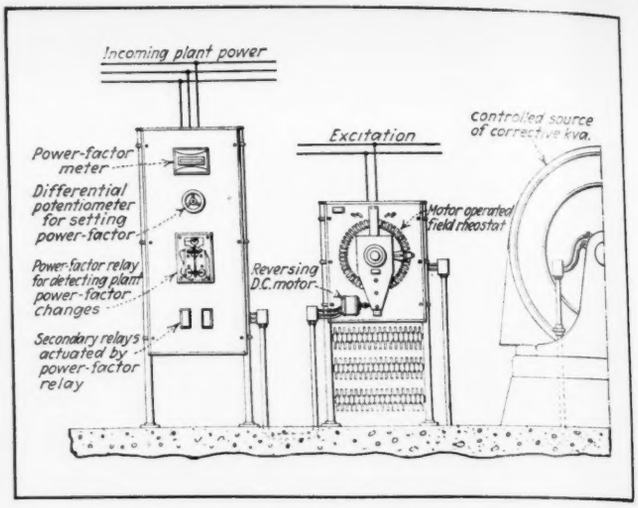

Incoming plant power
Excitation
controlled source of corrective kva.
Power-factor meter
Differential potentiometer for setting power-factor
Power-factor relay for detecting plant power-factor changes
Secondary relays actuated by power-factor relay
Reversing D.C. motor
Motor operated field rheostat

Fig. 10. Simplified diagram of an automatic constant power-factor system. A motor-generator set which uses an oversize synchronous motor to give wide-range power-factor control through variable field excitation. In addition to a 300-kw. power load, the unit has a range from 3,000 kv.-a. lagging to 750 kv.-a. leading.

Draw *CGE* to represent a leading power-factor synchronous-motor load aggregating 200 kw. Check the power-factor angle of *C E* (angle *G C E*) and it shows that .61 is needed. In other words, a .61 leading power-factor synchronous motor giving 200 kw. can be added to a .68 lagging 700-kw. load without increasing the system heating or voltage drop.

Now let's try another method (Fig. 8). Construct the basic diagram *ABCDE* as in Fig. 7. Draw *E F* on an .8 leading power-factor slant. Measure *F H;* it shows that by substituting 60 kw. in .8 leading power-factor load for a like amount of .68 lagging power-factor load that a standard commercial .8 leading power-factor unit or units can be used to improve the power-factor and add a 200-kw. load.

Fig. 9. There are several other ways of working out this problem. Try this (Fig. 9): Construct the basic diagram *ABCDE* as in Fig. 7. Draw *FGE* to represent a 200-kw. .8 leading power-factor synchronous-motor load. Measure *CF*, which shows 100 lagging reactive kv.-a. to be neutralized. Apply a 100-kw. capacitator (static condenser) to make the necessary improvements.

Some of the other expedients to be investigated would be:

(a) Substitution of unity power-factor loads for equal amounts of .68 load and add 200 kw. in unity or leading loads.

(b) Substitution of .8 synchronous-motor load for equal amount of .68 load and finish out with 200-kw. unity power-factor load.

(c) Use capacitators or synchronous condensers for part-way improvement and add unity power-factor load to finish.

Fig. 10 shows a simplified diagram of an automatic constant power-factor system.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

J. B. JOHN
President and General Manager
Medusa Portland Cement Co.
Cleveland, Ohio

Personal Mention

R. M. Greathouse, formerly connected with the S. & M. Gravel Co. of Oakland, Cal., has acquired by outright purchase the Felton Sand & Gravel Co. at Felton, Cal.

Peter Stewart was injured while at work in the quarry of the LeGrand Limestone Co., near Marshalltown, Ia., recently when he lost control of a drill which he was operating, the machine striking him in the groin. He was a hospital patient for several days but has now resumed his duties.

Martin H. Kidder, for several years press agent for Link-Belt Co., has recently established his own press service, with headquarters at 12238 Normal Ave., Chicago, Ill. Mr. Kidder will represent a few non-competing organizations in the disseminating of their material. One of his clients is the Harnischfeger Corp., Milwaukee, Wis.

G. L. Harman has been named general sales manager by the Keystone Driller Co. of Beaver Falls, Pa. Mr. Harman was, until recently, sales manager of the Industrial Brownhoist Corp., Cleveland, having been connected in a similar capacity with the Industrial Works of Bay City, Mich., from 1914 until this company was merged with the Brown Hoisting Machinery Co. Simultaneous with the above appointment, comes that of **Lynn H. Ransom** as chief engineer. He has, since 1926, been connected with the engineering department of the Keystone Driller Co.

G. L. Harman.

C. E. Glassen, formerly superintendent for the Columbia Quarry Co., St. Louis, Mo., has been appointed general superintendent of quarries by the Rock Hill Quarries Co., of St. Louis. Mr. Glassen will also have charge of the Denton Sand & Gravel Co. plant at Pacific, Mo.

C. D. Forsbeck has resigned his position as field engineer for the Portland Cement Assn., at Seattle, Wash., to become city engineer for the city of Tacoma. Mr. Forsbeck had been doing field work and general promotion for the association in that region for the last eight years.

H. H. Hall, of East St. Louis, Ill., is the newly elected president of the Illinois Assn. of Highway and Municipal Contractors. He is president of the H. H. Hall Construction Co.

F. H. Wisewell, well-known Rochester engineer, has been appointed district manager of the New Rochester, N. Y., branch office of Stephens-Adamson Mfg. Co. He will be in charge of sales and engineering on the entire Stephens-Adamson line of equipment.

J. S. Cline of Crab Orchard, Tenn., owner of a huge limestone deposit in that vicinity, is reported to be arranging for the formation of a syndicate looking to the erection of a cement plant on the site at some future date.

J. Vale Downie has resigned as advertising manager of the Keystone Driller Co. of Beaver Falls, Pa. The Frank Presbrey Co., general advertising agents, of New York, N. Y., will in the future handle all Keystone advertising.

T. E. Cocker, 85 High Park Blvd., Eggertsville Section, Buffalo, N. Y., has recently been appointed by the Dings Magnetic Separator Co. of Milwaukee to represent it as manager in that district.

H. C. Ramsey, vice-president in charge of international business of Worthington Pump & Machinery Corp., has sailed for Europe to spend ten weeks in the British Isles and on the continent studying conditions and visiting the company's manufacturing and sales organizations in England, France, Germany, Spain and other countries.

Benjamin Roach, an employee of the Purdy Sand & Gravel Co. at Coshocton, O., suffered a mashed toe when a large piece of material dropped on the member while at work at the plant recently.

J. F. Murphy, 2400 Faxon Ave., Memphis, Tenn., has recently been appointed distributor for the Link-Belt line of shovels-cranes-drag-lines in the Memphis district. Mr. Murphy's many friends throughout the levee-building district will no doubt be glad to hear of his appointment.

Peter Duncan and **H. H. McGrath** have formed a partnership and are opening a quarry and plant at Mountville, O., to produce crushed stone for local highway construction and maintenance.

Howard Wynn has been named manager of the newly organized Oklahoma Limestone Products Co. at Fort Towson, Okla. The firm will specialize in agricultural limestone.

Obituary

Richard Baker, 23, was killed June 28 at the plant of the Wabash Portland Cement Co., at Stroh, Ind., when he became caught on a bucket elevator used to handle powdered coal, was carried up to the point of discharge and dropped 40 ft. to a concrete floor below. Mr. Baker had been employed at the plant only a short time, having come to Stroh from Burr Oak, Mich, where his parents and members of his family reside.

Coming Events

August 11, 1932. St. Louis, Mo. Monthly meeting, St. Louis Quarrymen's Assn., Forest Park Hotel. E. J. McMahon, exec. sec., 4063 Forest Park Blvd., St. Louis, Mo.

August 22-26, 1932. Denver, Colo. Eighty-fourth meeting, American Chemical Society.

October 3-7, 1932. Washington, D. C. Twenty-first Annual Safety Congress, National Safety Council. W. H. Cameron, secretary, 20 N. Wacker Drive, Chicago, Ill.

November 28-December 5, 1932. New Orleans, La. Tenth Annual Asphalt Paving Conference and annual meeting, Assn. of Asphalt Paving Technologists. Under auspices of Asphalt Institute, 801 Second Ave., N. Y.

December 5-10, 1932. New York, N. Y. Tenth National Exposition of Power and Mechanical Engineering. Under management of International Exposition Co., Grand Central Palace. New York, N. Y.

December 7-9, 1932. Washington, D. C. Annual meeting, American Institute of Chemical Engineers.

Traffic News and Comment

Recent I. C. C. Decisions

Agricultural Limestone.—The railroads have been authorized to establish and maintain rates over circuitous routes, on ground and pulverized limestone, from Waukesha, Wis., to competitive destinations in the lower peninsula of Michigan and to Michigan City, Ind., equal to the lowest rates applicable over any line or route, from and to the same points, constructed on the basis of distance scales prescribed in Smelter v. Ann Arbor, 178 I.C.C. 324, and to maintain higher rates from and to intermediate points, provided they observe the lowest combination and the 50 and 70 per cent circuity limitation and rules. F.S.O. No. 10,964.

Examiner's Report

Crushed Sandstone. — Examiner Harold M. Brown recommends that the Commission award reparation on finding that the rates on crushed sandstone with 2 or 3 per cent. natural bituminous content, from Big Clifty, Ky., to Ironton, O., and Milwaukee, Wis., were unreasonable to the extent they exceeded $2.10 to Ironton and $2.45 to Milwaukee. I.C.C. Docket No. 24936, O. A. Smith Agency, Inc., v. I. C. et al.

New Complaints Filed

Cement.—Complainant asks refund of unreasonable overcharge in violation of section 6 on cement from York, Pa., to Trident, Mont., in I.C.C. Docket No. 25,376, Medusa Portland Cement Co., Cleveland, O., v. A. A. et al.

Dolomite.—Reparation is asked for on an allegation of violation of section 1 on shipments of raw dolomite from McVitty's, O., to Freeport, Ill., in I.C.C. Docket No. 25,383, The Herzog Lime & Stone Co., Forest, O., v. C. M., St. P. & P. et al.

Rate-Committee Dockets

New England Freight Assn.

Lime.—To enable shippers at Ashley Falls, Mass., Canaan, Danbury, East Canaan, Conn., Lee and West Stockbridge, Mass., to compete with shippers in the Cedar Hollow and York, Pa., districts, they are asking that the rate on lime, c.l. min. wt. 50,000 lb., to New York piers, Brooklyn and New York lighterage points, be reduced from 14½ c. per 100 lb., to 13 c. Docket No. 25,828.

Trunk Line Assn.

Cement-Flue Dust.—Shippers propose that the rate on cement-flue dust, c.l. min. wt. 40,000 lb., from Security, Md., to Lebanon, Pa., be reduced from 15 c. to 12 c. per 100 lb. Docket No. 29,443.

Crushed Stone.—Carriers propose to publish a rate of 90 c. per net ton on crushed stone from Blue Mount, Md., to Washington, D. C. Docket No. 29,456, Sup. 1.

Mica Schist.—Shippers at Glenside, Ardsley, Somerton, Spring Mill and Wernersville, Pa., are proposing the following rates on mica schist, c.l. min. wt. 30,000 lb., as fairly comparable with the rates applying from New Castle, Pa. Rates are per net ton. Docket No. 29,473.

To	Proposed
Chicago, Ill.	$6.20
Cleveland, O.	4.30
Sandusky, O.	4.70
Detroit, Mich.	4.70
Dayton, O.	5.10
Pittsburgh, Pa.	3.60
Michigan City, Ind.	5.90
Youngstown, O.	4.00
Cincinnati, O.	5.30
Charleston, W. Va.	5.00
St. Louis, Mo.	7.30

Fluorspar.—The establishment of a rate on fluorspar, c.l. min. wt. 40,000 lb., from Baltimore, Md., to Port Hope, Ont., of $5.70 per gross ton, is proposed by shippers. Docket No. 29,464.

Lime.—Carriers propose the establishment of rates from Carson and Karo, Va., to Hawk Run, Phillipsburg, Shawsville, Surveyor, Bald Hill, Frenchville, Karthans, Cataract, Spruce, Coleman's Siding and Keating, Pa., on building lime of 17 c., and on agricultural, land and chemical lime of 16 c. per 100 lb., c.l. min. wt. 30,000 lb. Docket No. 28,309, Sup. 2.

Carriers propose to establish on (a) building lime, (b) agricultural and chemical lime and ground limestone, c.l. min. wt. on lime 30,000 lb., and on limestone 50,000 lb., from York, Thomasville and Bittinger to Avis to Patton, Pa., inclusive (a) 15½ c. and (b) 14½ c. per 100 lb.; from Cavetown, Security, Pinesburg, Charlton, Md., and Nessle and Snyder, W. Va., to Hawk Run to Keating, Pa., inclusive, (a) 17 c., and (b) 16 c. per 100 lb. Docket No. 28,309, Sup. 3.

Dolomite, Roasted.—Carriers propose to amend trunk line tariffs, naming commodity rates on burnt or roasted dolomite between points in trunk line territory and from trunk line territory by providing therein the following restriction: "Rates apply on dolomite, roasted (refractory dolomite, in granular form, treated or untreated, clinkered and/or burned to a dead state)." Docket No. M-3,065.

Sand.—Carriers propose to establish rates on industrial sands,[1] and ground flint, c.l. min. wt. 40,000 lb., from Western Maryland Ry., Hancock-Round Top district and B. & O. R.R., Hancock-Berkeley Springs district to Strasburg, O., of 14 c. per 100 lb., and on glass sand,[1] from Gore-Triplett, Va., to Strasburg, O., of $2.95 per net ton. Docket No. 29,313, Sup. 1.

Soapstone.—Shippers propose the establishment of a rate of $3.45 per net ton on crushed or ground soapstone from Schuyler, Va., to Philadelphia, Pa. Docket No. 29,480.

Central Freight Assn.

Amiesite.—Carriers propose to reduce the commodity description published in agency and individual lines' tariffs naming specific rates on stone, coated, between points in C.F.A. territory, also from C.F.A. territory to arbitrary territory east of Pittsburgh, Pa., to read as follows: Stone, crushed, slag and/or gravel, coated with oil tar or asphaltum.[1] (Note—The oil, tar and/or asphaltum not to exceed 10 per cent. by weight of the commodity as shipped, the shipper to so certify on the shipping orders and bills of lading.) Docket No. 32,000 cancels Docket No. 31,447.

On the above described commodity the carriers propose to establish a rating of 16 per cent. of first class from points in C.F.A. territory to points east of the Western Termini of Eastern Trunk Lines. Docket No. 31,999.

Shippers propose the establishment of the following rates on crushed stone, coated with tar or asphaltum, from Jackson, O. to McArthur, Creola, Orland, O., 76 c.; New Plymouth, Starr, Union Furnace, Logan, Athens, Vinton, Bidwell, Kerrs, Gallipolis, O., 91 c.; Lancaster, Sugar Grove, Haydenville, Nelsonville, Middleport, O., 99 c.; Pomeroy, O., $1.06 and to Radcliff, O., 84 c. per net ton. Docket No. 32,024.

On gravel and/or crushed stone, to which has been added oil, tar or asphalt in the amount to form more than 2 per cent. but not more than 9 per cent. of the whole mixture, shippers propose a rate from South Lebanon, O., to Berea, Ky., of $2.40 per net ton. Docket No. 32,070.

Crushed Stone.—A reduction in the rate on crushed stone and related articles, from Painesville and Perry, O., to Mentor, Willoughby and Wickliffe, O., from 60 c. to 50 c. per net ton, is proposed by shippers. Docket No. 32,097.

Shippers at Bloomville, O., propose a reduction in the rate on crushed stone and related articles to Shiloh, O., via P.R.R., Vernon, O., Big 4, from 80 c. to 70 c. per net ton. Docket No. 32,062.

Shippers at Marion, O., propose establishment of a rate of $1.10 per net ton on crushed stone to Little Hocking, Porterfield and Belpre, O., via C. & O., Athens, O., B. & O. Docket No. 32,054.

A rate of $1.10 per net ton is proposed by shippers to apply on crushed

stone and related articles from Centerville, O., to Connersville, Ind. Docket No. 32,056.

Lime.—Shippers at Menominee, Mich., are proposing the establishment of rates on agricultural lime, c.l. min. wt. 30,000 lb., to destinations in the southern peninsula of Michigan, based on 80 per cent. of the rates applying on common lime. Complete copy of exhibit will be furnished on request. Docket No. 32,091.

Gravel.—Shippers at E. St. Louis, Ill., and St. Louis, Mo., propose the establishment of a rate on gravel to Cote St. Paul (Montreal), Quebec, Canada of $7.80 per net ton. Docket No. 31,993.

Sand.—Reduced rates on sand (lake, river and bank, other than sand loam), in open top cars, from Gary, Miller and Willow Creek, Ind., are proposed by shippers. Proposed rates are: to Decatur, $1.39; Litchfield, $1.51; Quincy, $1.77; E. St. Louis, Ill., $1.89; St. Louis, Mo., $1.89 and to Springfield, Ill., $1.39 per net ton. Docket No. 32,096.

Sand and Gravel.—Carriers propose to reduce the rate on sand and gravel from Geauga Lake and Mantua, O., to Painesville, Wickliffe and Willoughby, O., to 75 c. per net ton, for N. Y. C. & St. L. delivery. Docket No. 32,090.

Sand and Slag.—Carriers propose to reduce the rate on common sand and crushed commercial slag to Mercer, Pa., from Clairton, Duquesne, Wharff, Munhall, South Duquesne, Bessemer, Briquette, Homestead, Mifflin Jct., North Bessemer, Rankin and Wylie, Pa., from $1.00 to 90 c. per net ton. Docket No. 32,131.

Illinois Freight Assn.

Agricultural Limestone.—At present the rates on agricultural limestone from Elmhurst and Quincy, Ill., to destinations in I.F.A. territory are on the crushed stone basis. It is proposed to publish rates to these points based 20 c. per ton over the Chicago rate. Docket No. 6,639-A.

Amiesite.—It is propcsed to rates on crushed stone to also apply on crushed stone coated with oil, tar or asphaltum,[1] from Chicago, Ill., to points in Illinois. Docket No. 3,339-A.

Crushed Stone.—A reduction in the rate on crushed stone from Joliet, Ill., to Middletown, Croft, Fancy Prairie and Van Wood, Ill., from $1.26 to $1.01 has been proposed.

Commodity rates to apply in lieu of the present classification basis on crushed stone from East St. Louis and Falling Springs, Ill., which have been proposed are, to Bement, $1.01; Voorhies, $1.13; Lanton Spur, $1.26 and to Altamont, Ill., $1.26 per net ton. Docket No. 6,701.

Sand.—Reduced rates on industrial sands,[1] to Marseilles, Ill., have been proposed from Ottawa, Ill., from 63 c. plus 6 c. emergency charge, to 50 c. plus 5 c. emergency charge, and from Utica, Ill., from 70 c. plus 6 c. emergency charge, to 60 c. plus 5 c. emergency charge. Docket No. 6,706.

Sand and Gravel.—The following reductions are proposed on sand and gravel rates:

From Grayville, Ill., to Olney, Ill.,[2] from 76 c. to 65 c. per net ton. Docket No. 6,128-A.

From Allison Branch, Ill.,[1] to Pawnee, Sicily and Humphrey, Ill., from classification basis to $1.26 per net ton. Docket No. 6,694.

From Allison Branch, Ill.,[1] to Boulder, Ill., to $1.13; to Litchfield, Ill., $1.26; to Virden, Ill., $1.39; to Franklin, Ill., $1.51, and to Mermet, Ill., to $1.49. Present rates are on classification basis. Docket No. 6,695.

From Joliet, Ill.,[1] to Lintner, Ill., to $1.13 per net ton. Docket No. 6,698.

From Merom and Riverton, Ind.,[2] to Olney, Ill., from 84 c. to 70 c. per net ton. Docket No. 6,718.

Slag.—It is proposed to establish the following rates on ground slag or ground slag and ground limestone mixed,[1] from Buffington, Ind.: To Lockport, Ill., 85 c.; to Marseilles, Ill., 90 c.; to Wilmington, Ill., 90 c.; to Vandalia, Ill., $1.39, and to East St. Louis, Ill., $1.39 a net ton. Docket No. 6,711.

Western Trunk Line Committee

Cement.—Shippers propose a modification of the c.l. min. wt. on shipments of cement between points in Iowa to 38,000 lb. The present min. wt. is 50 000 lb., except that when marked capacity of car used is less, the actual weight will apply, but not less than 40,000 lb.

Lime.—Shippers at Mosher and Ste. Genevieve, Mo., propose publication of a rate of 31½ c. per 100 lb., on lime, c.l. min. wt. 30,000 lb., to Mitchell, S. D. The present rates are 38½ c. c.l. min. wt. 60,000 lb., and 40½ c. c.l. min. wt. 30,000 lb. Docket No. 403-L.

Plaster.—Shippers at Blue Rapids and Irving, Kans., propose the addition of wall plaster and plaster of paris at the same rates applying on plaster, stucco and Keene's cement, in straight or mixed carloads to Official Classification territory and to points in Canada published in Union Pacific Tariff No. 3,078-E. Docket No. 1,-278-H.

Southern Freight Assn.

Cement.—It is proposed to increase the rate on cement from Birmingham, Ala., and grouped points to Stanstead, Que., and Toronto, Ont., from 43 c. to 46 c. per 100 lb., in Agent Spieden's Tariff 38-H, and to add the T. H. & B. Ry. as a participating carrier in Tariff 192-D.

Mica.—The reëstablishment of the rate of 24 c. per 100 lb., on mica, crude or scrap, from Axton, Carlisle and Martinsville, Va., to Rutherford, N. J., with a c.l. min. wt. of 30 000 lb., has been proposed. Docket No. 58,-333.

Sand and Gravel.—Reduced rates on sand and gravel,[1] from Miami and Willey's, O., to destinations on the C. N. O. & T. P. in Kentucky have been proposed. Representative proposed rates are, to Ludlow, 80 c.; Erlanger, 80 c.; Dry Ridge, $1.00; Delaplain, Ky., $1.20 per net ton. Docket No. 58,307.

[1] The c.l. min. wt. will be 90 per cent of the marked capacity of car, except when loaded to full cubical or visible capacity, actual weight will apply.

[2] The c.l. min. wt. will be the marked capacity of the car.

Traffic Problem Queries

Q. What is a fourth-section violation?

A. Section 4 of The Interstate Commerce Act contains three provisions covering rates not subject to water competition. The first is known as the long-and-short-haul provision, making it unlawful to charge more for transportation for a shorter distance than for a longer distance, the shorter being included within the longer. The second provision makes it unlawful to charge a greater amount as a through rate than the aggregate of the intermediate rates. Finally the act gives the Interstate Commerce Commission the power to authorize the carriers to publish rates which are in violation of the first two provisions, which rates are then known as fourth section departures. If relief has not been granted by the Commission, any departure from the first two provisions are known as fourth-section violations.

Book Review

MATERIALS HANDBOOK. *Second Edition. By George S. Brady. Published by the McGraw-Hill Book Co., Inc., New York and London. 588 pp.* A new and revised edition of an encyclopedia for engineers, purchasing agents, executives and foremen. It fills a need among these professions similar to that supplied by the Britannica for the student and Roget's Thesaurus for the writer, giving in concise form the chief distinguishing data on the raw materials of engineering and manufacturing. This second edition was prepared with the needs of the product engineer in view. Without departing from the original intention to give the purchasing agent and industrial executive quick reference data to aid them in distinguishing and selecting materials, the items relating to engineering construction materials have been strengthened to include enough comparative data on the physical properties to enable the designing engineer to judge the relative merits of the particular material for the requirement in hand. A number of new materials have also been added.

Latest Portland-Cement Statistics

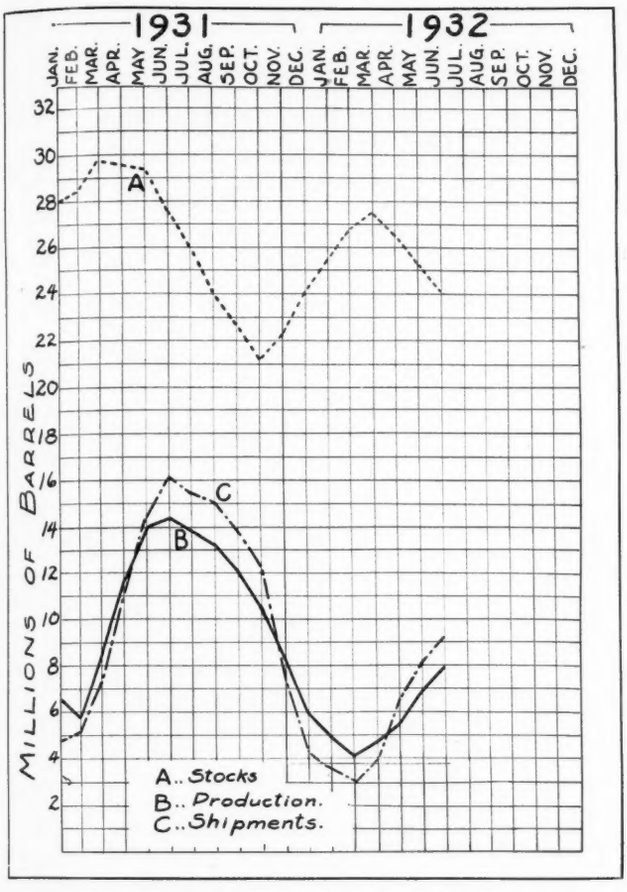


Chart showing monthly production, shipments and stocks on hand at end of month, from January, 1931, to June, 1932.

THE Portland-cement industry in June, 1932, produced 7,921,000 bbl., shipped 9,264,000 bbl. from the mills, and had in stock at the end of the month 24,051,000 bbl. Production in June, 1932, showed a decrease of 43.9 per cent. and shipments a decrease of 42.4 per cent., as compared with June, 1931. Stocks at mills were 12.9 per cent. lower than a year ago. The total production for the first half of 1932 amounts to 34,156,000 bbl., compared with 60,133,000 bbl. in the same period of 1931, and the total shipments for the first half of 1932 amount to 34,304,000 bbl., compared with 58,419,000 bbl. in the same period of 1931. The statistics here given are compiled from reports for June, received by the Bureau of Mines, from all manufacturing plants except four, for which estimates were used in lieu of actual returns.

DISTRIBUTION OF CEMENT

Shipped to—	April		May	
	1931	1932	1931	1932
Alabama	219,593	44,565	183,572	26,007
Alaska	1,153	524	946	2,259
Arizona	47,083	15,893	42,634	15,430
Arkansas	183,121	14,534	187,370	17,496
California	653,624	455,498	628,900	400,264
Colorado	70,204	61,974	124,139	60,878
Connecticut	150,380	94,490	176,666	114,826
Delaware	32,856	28,895	47,276	38,984
District of Columbia	119,153	97,351	130,588	94,829
Florida	61,526	39,674	82,852	33,183
Georgia	182,817	82,155	156,532	93,256
Hawaii	20,849	29,953	25,580	26,370
Idaho	21,558	12,480	19,917	10,963
Illinois	717,468	335,544	882,739	703,571
Indiana	256,697	157,969	411,373	310,262
Iowa	309,768	145,776	611,996	182,684
Kansas	184,369	126,952	328,414	127,362
Kentucky	197,013	90,728	231,958	127,033
Louisiana	277,366	58,675	314,748	79,682
Maine	36,091	26,384	54,690	36,870
Maryland	181,752	140,479	199,360	168,539
Massachusetts	279,032	209,812	323,576	249,071
Michigan	395,559	179,013	659,977	304,783
Minnesota	268,765	164,514	468,010	348,504
Mississippi	53,159	25,123	82,827	14,928
Missouri	406,831	250,745	511,513	442,725
Montana	24,187	18,034	30,139	12,840
Nebraska	131,416	68,633	237,284	71,205
Nevada	11,722	36,163	10,999	47,891
New Hampshire	30,884	23,710	42,169	20,082
New Jersey	484,331	297,700	557,649	354,171
New Mexico	30,751	24,577	42,604	20,550
New York	1,527,913	970,867	2,013,197	1,095,796
North Carolina	123,303	55,225	146,249	52,396
North Dakota	35,616	19,740	43,024	22,113
Ohio	491,647	310,376	668,196	392,409
Oklahoma	244,250	123,596	301,925	124,276
Oregon	105,653	71,357	104,620	58,860
Pennsylvania	697,081	427,501	801,763	450,430
Porto Rico	2,825	5,645	3,905	4,875
Rhode Island	73,310	31,523	81,320	37,208
South Carolina	234,756	55,309	256,625	43,529
South Dakota	56,775	27,070	77,241	20,924
Tennessee	151,183	98,855	158,104	103,203
Texas	524,419	403,806	597,840	358,964
Utah	31,633	15,997	30,513	16,116
Vermont	22,391	15,312	24,529	25,911
Virginia	162,050	86,856	183,752	88,465
Washington	211,323	163,168	276,386	199,080
West Virginia	92,214	65,620	128,383	86,484
Wisconsin	288,648	176,417	431,564	227,413
Wyoming	13,920	7,547	17,243	10,626
Unspecified	19,876	24,551	12,082	7,406
	11,151,864	6,514,855	14,167,458	7,983,982
Foreign countries	32,136	21,145	32,542	36,018
Total shipped from cement plants	11,184,000	6,536,000	14,200,000	8,020,000

PRODUCTION AND STOCKS OF CLINKER BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Stocks End of Month		Month	Production		Stocks End of Month	
	1931	1932	1931	1932		1931	1932	1931	1932
January	8,129	6,107	10,384	8,184	July	12,246		10,209	
February	7,473	5,176	11,946	9,375	August	11,664		8,468	
March	9,586	5,443	13,318	10,025	September	10,414		6,918	
April	11,540	5,924	13,854	10,511	October	9,825		6,021	
May	13,159	6,273	13,087	9,922	November	8,259		6,215	
June	12,679	6,803	11,837	8,857	December	6,840		7,035	

RELATION OF PRODUCTION TO CAPACITY

	June		May	April	March
	1931 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)	1932 (*per cent.*)
The month	65.4	35.7	30.2	24.8	21.3
The 12 months ended	55.2	36.5	38.9	41.7	43.8

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1931 AND 1932 (*thousands of barrels*)

Month	Production		Shipments		Stocks at End of Month	
	1931	1932	1931	1932	1931	1932
January	6,595	5,026	4,692	3,393	27,759	25,778
February	5,920	3,971	5,074	3,118	28,612	26,657
March	8,245	4,847	7,192	3,973	29,676	27,545
April	11,245	5,478	11,184	6,536	29,715	26,496
May	14,010	6,913	14,200	8,020	29,554	25,394
June	14,118	7,921	16,077	9,264	27,602	24,051
July	13,899	.....	15,545	.....	25,934	.....
August	13,549	.....	15,172	.....	24,313	.....
September	12,092	.....	13,671	.....	22,736	.....
October	10,762	.....	12,360	.....	21,218	.....
November	8,161	.....	7,156	.....	22,219	.....
December	5,974	.....	4,142	.....	24,098	.....
Totals	124,570	.....	126,465	.....	.....	.....

PRODUCTION AND STOCKS OF CLINKER, BY DISTRICTS, in MAY, 1931 and 1932 (*thousands of barrels*)

District	Production		Stocks at end of Month	
	1931	1932	1931	1932
Eastern Pa., N. J., and Md	2,660	1,456	1,731	1,079
New York and Maine	1,021	625	1,212	760
Ohio, Western Pa., and W. Va	1,271	458	1,402	825
Michigan	623	515	1,415	1,213
Wis., Ill., Ind., and Ky	1,533	809	1,490	1,004
Va., Tenn., Ala., Ga., Fla., and La	1,274	445	709	414
Eastern Mo., Ia., Minn., and S. Dak	1,145	998	930	611
W. Mo., Neb., Kan., Okla., and Ark	1,143	541	695	789
Texas	702	280	270	284
Colo., Mont., Utah, Wyo., and Idaho	297	174	280	146
California	754	372	1,364	1,498
Oreg. and Wash	256	130	339	234
Totals	12,679	6,803	11,837	8,857

PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN JUNE, 1931 AND 1932, AND STOCKS IN MAY, 1932 (*thousands of barrels*)

District	June						Stocks at End of May 1932
	Production		Shipments		Stocks at End of Month		
	1931	1932	1931	1932	1931	1932	
Eastern Pa., N. J., and Md	2,900	1,389	3,260	1,747	6,465	5,150	5,508
New York and Maine	1,230	822	1,360	917	1,914	1,697	1,792
Ohio, Western Pa., and W. Va	1,505	645	1,507	785	3,511	2,889	3,029
Michigan	919	544	1,030	676	2,372	2,080	2,211
Wis., Ill., Ind., and Ky	1,757	1,128	2,220	1,419	3,915	3,271	3,561
Va., Tenn., Ala., Ga., Fla., and La	1,312	603	1,463	532	1,479	1,830	1,759
Eastern Mo., Ia., Minn., and S. Dak	1,300	1,103	1,917	1,320	3,244	3,218	3 435
W. Mo., Neb., Kan., Okla., and Ark	1,187	563	1,303	637	1,710	1,269	1 344
Texas	634	335	693	324	675	695	685
Colo., Mont., Utah, Wyo., and Idaho	298	157	278	128	629	407	378
California	745	464	737	590	1,113	975	1,101
Oreg. and Wash	331	168	309	189	575	570	591
Totals	14,118	7,921	16,077	9,264	27,602	24,051	25,394

EXPORTS AND IMPORTS OF HYDRAULIC CEMENT, BY MONTHS, IN 1931 AND 1932

Month	Exports				Imports			
	1931		1932		1931		1932	
	Barrels	Value	Barrels	Value	Barrels	Value	Barrels	Value
January	41,199	$115,678	36.704	$82,984	95,609	$120,298	14,375	$16,648
February	25,703	88,989	12,889	39,350	21,984	25,391	83,706	69,197
March	54,599	144.579	39,105	81,856	70,378	80,360	19,173	17,215
April	40,478	116,564	30,123	69,451	53,333	58,576	59,392	41,487
May	48,028	140,953	31,634	71,048	19.325	20,568	9,223	7,358
June	43,597	107.610	.....	.....	32,079	42.955	.....	.....
July	29,344	97,837	.....	.....	14,332	15,582	.....	.....
August	39.517	106.643	.....	.....	8,895	11.739	.....	.....
September	27,570	81.399	.....	.....	33.574	33.520	.....	.....
October	24.531	68 524	.....	.....	39,642	42,380	.....	.....
November	33,200	97,796	.....	.....	27,940	22,235	.....	.....
December	21,887	54,028	.....	.....	40,147	34,314	.....	.....
Totals	429,653	1,220,600	.....	.....	457,238	507,918	.....	.....

Nebraska Sand Producer Buys Tract at Oakdale

The Carstenson Sand Co. of Columbus, Neb., has acquired a new deposit located near Oakdale, Neb. The deposit promises to be a difficult one to work, according to William Seibold, a member of the firm, and considerable screening and washing equipment has been installed to overcome these difficulties.

Multi-Wall Sewn Paper Bags Urged for Economy

A movement of particular interest to cement manufacturers has been launched by the Associated Manufacturers of Multi-Wall Sewn Paper Bags, an organization recently formed by leading producers of this type of package.

Modern developments in the manufacture of cement, particularly the tendency toward finer grinding and the use of special, high-early-strength cements, make the protection against premature moisture, afforded by the paper bag, more desirable than ever, it is claimed. Present-day conditions in the construction industry, it is pointed out further, have taken the multi-wall sewn paper bag out of the "luxury class" and have made it a necessity. This is especially true of the small jobs which make up so large a part of this year's building operations. On these, it is contended, the cost of picking up, sorting, cleaning and shipping back "returnable" bags would eat up what little profits there are, without counting the losses which result from sifting through the fabric or retention of the material in the mesh of a cloth container.

Members of the Associated Manufacturers of Multi-Wall Sewn Paper Bags are Arkell & Smiths, Canajoharie, N. Y.; Bates Valve Bag Corp., New York, N. Y.; Bemis Bro. Bag Co., Peoria, Ill.; The Jaite Co., Jaite, O.; The Thos. Phillips Co., Akron, O.; The Raymond Bag Co., Middletown, O.; Taggart Bros. Co., Inc., New York, N. Y.; Universal Paper Bag Co., New Hope, Pa.; and The Valve Bag Co., New York, N. Y.

Enter Consent Decrees in Valve-Patent Suits

The patent suits between Merco Nordstrom Valve Co. and Walworth Co. have been terminated by the entry of consent decrees in favor of the former, and cross-licensing arrangements established whereby Walworth Co. are authorized to use the Sealdport and other valuable Merco Nordstrom Valve Co. patents.

Under this cross-licensing arrangement, which is conditioned upon the payment of suitable royalties, the most advanced practice in all features of lubricated-plug valve design, including the Sealdport lubrication, is made available to both companies.

Financial News

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Alpha Loss $1,193,449 in Year Ended June 30

Alpha Portland Cement Co. reports for the twelve months ended June 30, 1932, net loss of $1,193,449 after taxes, depreciation, etc. This compares with net income of $546,583 equivalent after 7 per cent. preferred dividend requirements to 57 c. a share on 711,000 no-par shares of common stock in twelve months ended June 30, 1931.

The balance sheet as of June 30, 1932, shows total assets of $27,841,789 comparing with $30,507,541 on June 30, 1931. Current assets, including $4,902,440 cash and marketable securities, amounted to $7,862,452 and current liabilities were $335,801. This compares with cash and marketable securities of $6,222,988, current assets of $9,612,736 and current liabilities of $640,692 on June 30, 1931. Surplus, including $5,648,500 arising from reduction of stated value of common stock in 1931, amounted to $6,286,429 on June 30, last.

Jones Opposes Sales at Loss to Obtain Business

"We have not mortgaged the coming year's business by accepting contracts at the prevailing low prices," declared C. C. Jones, president of the Wolverine Portland Cement Co., in transmitting his annual report to the stockholders. The company sustained an operating loss of $152,185 in 1931 as compared with a profit of $29,786 in the preceding annual period.

	1931	1930
Net sales	$ 278,221	$ 590,789
Cost of sales	322,265	426,392
Depreciation and depletion	60,983	64,997
Operating expenses	47,159	69,614
Operating loss	152,185	*29,786
Other income	6,886	6,609
Total loss	145,299	*36,395
Taxes, etc.	12,032	4,357
Net loss	157,331	*32,038
Dividends	.....	60,000
Deficit for year	157,331	27,962
Less reserve for decline in investments	13,375	.....
Less sundry surplus adjustments	414	6,447
Reserve credit for insurance	40,000	.....
Profit and loss surplus	32,585	163,705

* Profit.

Assets

	1931	1930
Current assets:		
Cash	$ 99,551	$ 126,572
Investments (market)	25,581	44,177
Notes, accounts receivable	11,100	32,869
Inventories	225,846	304,881
Total current assets	$ 362,078	$ 508,499
Fixed assets	664,916	708,804
Deferred	23,243	7,710
Total assets	$1,050,237	$1,225,013

Liabilities

Current liabilities:		
Accrued taxes	$ 12,455	.....
Accrued expenses	5,198	$ 2,212
Accounts payable	.....	14,739
Provision for income tax	.....	4,357
Total current liabilities	$ 17,652	$ 21,308
Capital stock	1,000,000	1,000,000
Appropriation of insurance reserve	.....	40,000
Profit and loss surplus	32,585	163,705
Total liabilities	$1,050,237	$1,225,013

Beaver Portland Cement Net Loss $8,557 in 1931

A net loss of $8,557 was reported for the twelve-months' operating period ended December 31, 1931, by the Beaver Portland Cement Co. This compares with a net loss of $1,238 in the preceding year. No dividends were paid on the common stock in either year and preferred dividends were not paid in 1931.

Income Account

	1931	1930
Sales	$ 329,102	$ 519,711
Cost of sales, etc.	247,266	404,771
Depreciation and depletion	52,229	55,436
Operating income	29,606	59,504
Other income	3,185	2,695
Total income	32,791	62,199
Interest charges	22,125	23,801
Tax provision	7,223	9,219
Other deductions	12,000	30,417
Net loss	8,557	1,238
Preferred dividends	.....	15,517
Deficit	$ 8,557	$ 16,755

Assets

Plant and equipment	$1,789,605	$1,785,168
Current assets:		
Cash	17,728	6,048
Notes and accounts receivable	49,266	52,911
Inventories	151,050	170,870
Other current assets	2,985	1,552
Due from affiliated companies	23,366	23,219
Deferred charges	72,318	74,687
Total	$2,106,317	$2,114,455

Liabilities

Preferred stock	$ 443,330	$ 443,330
Common stock	500,000	500,000
Funded debt	283,500	304,000
Current liabilities:		
Notes and accounts payable	18,546	42,640
Accrued interest	3,307	3,547
Tax reserve	7,481	9,312
Reserve for depreciation	377,992	329,316
Other reserves	19,525	20,050
Deferred credits	6	106
Surplus	452,630	462,154
Total	$2,106,317	$2,114,455
Current assets	221,028	231,381
Current liabilities	29,335	55,499
Working capital	$ 191,694	$ 175,882

Lehigh Portland Cement Operations Entail Loss

Lehigh Portland Cement Co. reports for the twelve months ended June 30, 1932, net loss of $484,020 after depreciation, federal taxes, etc. This compares with net profit of $1,631,440, equivalent after 7 per cent preferred dividends, to 46c a share (par $50) on 450,348 shares of common stock for the twelve months ended June 30, 1931. The company's plant at New Castle, Pa., has resumed operations, after a shutdown of several months, recalling 150 employees to work. Three daily shifts of eight hours each have been started. The plant has sufficient orders on hand to maintain near capacity operations until late in the autumn.

Medusa, Newaygo Fail to Pay Preferred Dividend

Two cement companies were forced to omit dividends on their preferred stocks in July.

The quarterly payment of $1.50 due July 1 on the preferred A stock of the Medusa Portland Cement Co., was not paid, while directors of the Newaygo Portland Cement Co. failed to take action on the regular payment of $1.75 due July 1 on the company's preferred shares.

DIVIDENDS DECLARED AND AWAITING PAYMENT

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE	COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Arundel Corp	Common	$0.75 qr.	June 23	July 1	Owens-Illinois Glass	Preferred	$1.50 qr.	June 1	June 15
Boston Sand & Gravel	Common	$0.05 qr.	June 22	July 1	Pacific Portland Cement	Preferred	$1.62½ qr.	June 30	July 5
Boston Sand & Gravel	Preferred	$0.87½ qr.	June 22	July 1	Pennsylvania Salt	Common	$0.75 qr.	June 30	July 15
Calaveras Cement	Preferred	$1.75 qr.	June 30	July 15	Pittsburgh Plate Glass	Common	$0.25	June 10	July 1
Hazel Atlas Glass	Common	$0.75 qr.	June 18	July 1	Santa Cruz Portland Cement	Common	$1.00 qr.	June 21	July 1
Ideal Cement Co	Common	$0.50 qr.	June 15	July 1	Southwestern Portland Cement	Common	$1.50 qr.	.....	July 1
International Salt	Common	$0.37½ qr.	June 15	July 1	Southwestern Portland Cement	Preferred	$2.00 qr.	.....	July 1
Johns-Manville	Preferred	$1.75 qr.	June 15	July 1	Superior Portland Cement	Class A	$0.27½M	July 23	Aug. 1
Kelley Island Lime & T	Common	$0.25 qr.	June 20	July 1	Superior Portland Cement	Class B	$0.12½	June 15	July 20
Leslie-California Salt	Common	$0.20 qr.	June 15	July 1	Worcester Salt	Common	$1.25 qr.	June 23	July 1

Foreign Developments

Chamber Blasting Urged in Interest of Economy

Chamber blasting has been finding wider acceptance in Germany since the War, and will probably be even further favored as its merits become better known. The writer accordingly reviews in two comprehensive articles the procedure in chamber blasting, the equipment required, and its advantages. As a striking example of the suitability of this method, the author compares the blasting operations in 1927 and 1928, when all blasting was done in drill holes 6 meters deep, with those in 1930 and 1931, when the chamber method was used exclusively, at a columnar basalt quarry. The total production of stone was 108,000 metric tons in 1927, 107,500 tons in 1928, 106,000 tons in 1930 and 69,200 in 1931. In the first two years the average consumption of explosive was 70.7 grams per ton; in the second two years 51.35 grams. The drilling amounted to an average of 30.79 cu.cm. per ton of stone in the first two years, and 5.01 cu.cm. in the second two years. The saving in cost was calculated at 56 per cent.

It is suggested that smaller quarries for whom it is not practicable to invest in the necessary equipment may let out the drilling work to contractors who do have this equipment, particularly in the industrial districts.—Dipl.-Bergingenieur Götzen in *Steinindustrie* 27:66-68 and 83-84, April 28 and May 26, 1932.

Natural-Cement Makers Turn to Control Method

At Settenz, in what is now Czechoslovakia, there is a good deposit of clay overlying a hard marl. Both materials have been worked for many years, the clay for the production of brick and the marl for the burning of lime. In 1912 the owners of the property formed a corporation, made extensions and improvements in the brick works and entered the manufacture of cement. As the marl underlying the clay has a lime content varying only between 77 and 78 per cent., it was excellently adapted to the manufacture of natural cement, and this was the first product made. This process had the disadvantages, however, that the coarse lumps of marl did not sinter uniformly, and also that the clinker had to lie several months in storage. These considerations were responsible for the decision to convert the plant to the manufacture of standard Portland cement.

The raw material is now ground and mixed and the chemical composition exactly controlled. It is prepared in a double-roll crusher, a ball mill and a tube mill with air separation. The clinker is burned in two high-capacity shaft kilns, yielding 120 metric tons each of excellent clinker daily, and ground in a Rekord mill 9 meters long. The plant's storage facilities can accommodate 4,000 tons of finished cement and 6,000 tons of clinker.—*Tonindustrie-Zeitung* 56:525, May 19, 1932.

Water-Cement Reaction Is Studied by Germans

In an investigation at the Institute of Cement Technology at the Berlin Technical College the authors studied the reaction between cement and water, after developing a method permitting the new formations in the hydration of cement to be studied separately from the "undecomposed cement," and obtained results indicating that the question of the hydraulic hardening of Portland cement is a problem of colloid chemistry.

The aluminate compounds are leached out of the cement particle by the reagent fluid; they hydrate in the fluid phase and separate out again as their hydro-aluminates. The silicate components react in a quite different manner; they release about half of their lime into solution and hydrate in the cement particle to a hydrosilicate of low lime content, which surrounds the cement particle as a gel mass. The ferrites take no essential part in the process of hydration. The reaction of the cement particle with water proceeds with different speeds for the different components; this leads to a corrosion of the cement particle and to the formation of zones of different stages of reaction. The violent separation of lime out of the tricalcium-silicate leads at times to a heavy supersaturation (50 per cent.) of the lime-water. The solubility of the hydro-silicates is exceedingly slight, that of the hydroaluminates comparatively high. Not only the formation of the hydro-silicates in the cement particle but also the separation of calcium hydrate and calcium-hydro-aluminate leads primarily to amorphus formations, which only after considerable time and then only partially, pass over to the crystalline state.—Dr. Hans Kühl and Wang Tao in *Zement* 21:105-111, 120-126, 134-139, Feb. 25, Mar. 3 and Mar. 10, 1932.

Electric Current Used to Check Set of Cement

At the eleventh congress of the Society of Industrial Chemistry in Paris, G. Baire, head of the laboratory of the Société des Ciments Francais, Boulogne-sur-Mer, pointed out that a pure cement paste has a certain electric conductivity which can be demonstrated by means of an ammeter, but that when the cement has begun to set the conductivity ceases and the needle of the instrument remains at zero. It would seem, therefore, that the results of the Vicat-needle test could be checked in this manner. Unfortunately, any electric current produces a rapid and intense heating of the paste, which naturally leads to an acceleration of the set and thus modifies the phenomenon which it is desired to observe.

To avoid this disadvantage as much as possible experiments have been made in letting the current pass only intermittently, that is, for several seconds and at more or less distant intervals; also, the test was made with a current of low voltage (27) and the most sensitive ammeter that could be obtained. Nevertheless, as soon as the current passes it always produces a slight heating, which, often repeated, acts on the set. In fact, the sets determined by means of the electric current are generally more rapid than those determined with the Vicat needle. From the theoretical point of view there is also a question whether the current itself (aside from the elevation of temperature) does not influence the formation of the salts which determine the hardening of cement.

With these reservations the method can make possible, in certain cases, some useful observations. The author has tried in this way to determine the period in which certain salts dissolve, and has determined notably that lime dissolved well before calcium sulphate. —*Revue des Materiaux de Construction* No. 272, pp. 181-2, May, 1932.

Bank of Fine Sand Is Brought Down by Blast

Interested by the success of blasting methods in other German sand-and-gravel pits, the firm M. Fried & Co., Klingenberg am Main, Germany, has recently adopted this method for bringing down fine sand from a non-caving bank. The charges are placed in horizontal bore-holes at the toe of the bank, 10 kg. of "Romperit C" in cartridges being used per hole. In the test blast to decide on the utility of blasting three such holes were fired, loosening and bringing down 648 cu. m. of sand (solid volume), and the total cost computed, including the explosive and the preparation of the bore-hole, was approximately 54 marks or about 0.08 mark per cu. m., said to be about one-fifth or one-sixth of what the equivalent cost by hand labor would be.—*Tonindustrie-Zeitung* 56: 472, May 2, 1932.

Recent Patents

AMERICAN

Crushing and Grinding

Crushing apparatus. Edgar B. Symons, Hollywood, Cal., assignor to Nordberg Mfg. Co., Milwaukee, Wis. No. 1,863,529.

Stone crusher. Earl J. Leap, Madley, Pa. No. 1,863,492.

Pulverizing or crushing machine. Edwin E. Elzemeyer and Henry C. Griesdenieck, Webster Groves, Mo., assignors to American Pulverizer Co., St. Louis, Mo. No. 1,862,889.

Drilling and Blasting

Rock drill. Elmer G. Gartin, Claremont, N. H., assignor to Sullivan Machinery Co., same place. No. 1,862,926.

Rock-drill feeding device. James G. Graham, Butte, Mont., assignor to Sullivan Machinery Co., Claremont, N. H. No. 1,861,853.

Blowing device for rock drills. Earl B. Lear, Phillipsburg, N. J., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,861,966.

Valve for rock drills. Fred M. Slater, Easton, Pa., assignor to Ingersoll-Rand Co., Jersey City, N. J. No. 1,861,984.

Hydraulic cartridge for use in mining, quarrying, and like operations. Henry B. Sheppard, Derby, England. No. 1,863,286.

Excavating

Control device for shovel cranes. Leslie A. Russell, Milwaukee, Wis., assignor to Koehring Co., same place. No. 1,861,511.

Excavating bucket. William L. Thompson, Starkville, Miss. No. 1,863,458.

Hoisting apparatus for power-operated shovels. William Ruddock, Whittier, Cal. No. 1,862,862.

Gypsum and Magnesia

Method of calcining gypsum. Walter Amoss, Buffalo, N. Y., assignor to Structural Gypsum Corp., Linden, N. J. No. 1,863,318.

Magnesia cement composition. Leroy C. Stewart, Midland, Mich., assignor to Dow Chemical Co., same place. No. 1,863,528.

Mixers, Concrete

Concrete Mixer. Vaino Piispanen, Helsinki, Finland, assignor to Koehring Co., Milwaukee, Wis. No. 1,863,029.

Washing

Gravel washer. Alexander L. Munro, Milwaukee Wis., assignor to Smith Engineering Works, same place. No. 1,861,578.

FOREIGN

Blasting and Explosives

Compositions for the fuseheads of electric mining and blasting fuses. Imperial Chemical Industries, Ltd., and W. O. Littlebury. British 373,255.

Detonating caps. J. Meissner. British 373,516.

Detonating caps. W. Eschbach and H. Wippenhohn. British 374,060.

Safety fuse for use in blasting and the like. Ensign-Bickford Co. British 374,032.

Concrete and Concrete Products

Method or process of and apparatus for manufacturing artificial stone, especially applicable to concrete tiles. R. Abraham, Ltd., and R. A. Abraham. British 374,358 (addition to 313,295).

Concrete pipe. Otto R. Schulze, East Aurora, assignee of John C. Schulze, Croton-on-Hudson, N. Y., and Georg W. Egerer, Westwood, N. J. Canadian 323,354.

Concrete mixture. Gardner S. Eldridge, Vancouver, B. C. Canadian 323,383.

Crushing and Grinding

Mills for pulverizing minerals and other substances. M. I. Williams-Ellis and A. E. Flewin. British 373,289.

Crusher-roll mechanism. American Engineering Co. British 373,441.

Stone-breaking, granulating and like machines. J. H. Mason. British 373,527.

Grinding mills. W. G. Hamblin. British 373,617.

Mechanism for regulating the feed in roller grinding mills. O. Moog. British 374,389.

Pulverizing mill. R. & H. Green and Silley Weir, Ltd., assignee of Edward W. Green and George R. Unthank, all of London, England. Canadian 323,500.

Drilling

Manufacture of hollow drill steel. E. Ameen and R. Olsson. British 373,167.

Valve mechanism for rock drills. W. W. Triggs (Ingersoll-Rand Co.). British 373,748.

Rock drill. Henry Ernest Warsop, Nottingham, England. Canadian 323,219.

Rock-drill-valve mechanism. Ingersoll-Rand Co., New York, N. Y., assignee of William A. Smith, Jr., Phillipsburg, N. J. Canadian 323,508.

Device for percussive tool. Ingersoll-Rand Co., New York, N. Y. Canadian 323,509.

Drying

Drying and heating process. Paul Rosin, Dresden, Germany. Canadian 322,427.

Drying apparatus. W. W. Spooner. British 374,152.

Kilns

Shaft kiln for burning cement. H. Engel, Stettin. German 550,232.

Chain arrangement in rotary kilns. L. Mellersh-Jackson (F. Krupp Grusonwerk Akt.-Ges.). British 373,409.

Materials-Handling

Elevating and conveying plant. H. Simon, Ltd., and H. Walder. British 373,245.

Hoppers, chutes and the like for feeding lumpy, granular or pulverulent material. E. Wheeler. British 373,611.

Screw conveyors. Clark Tructractor Co. British 373,941.

Apparatus for hoisting and discharging railway cars. B. E. Ellson. British 373,957.

Jig conveyors. H. Klerner. British 374,080.

Car-dumping apparatus. F. H. Rogers (J. Pohlig Akt.-Ges.). British 374,231.

Conveying apparatus. J. N. White. British 374,320.

Measuring and feeding mechanism. The Hardinge Co., Inc., assignee of Harlowe Hardinge, York, Pa. Canadian 323,272.

Sacking

Valve-bag manufacture. George S. Hoover, Wellsburg, W. Va. Canadian 322,588.

Valved paper-sacks or bags. W. W. Triggs (St. Regis Paper Co.). British 373,321.

Apparatus for filling valve bags with powdered or granular products. Bates International Bag Co. British 373,696.

Screening and Separating

Flotation concentration of minerals. Minerals Separation, Ltd. British 373,662 and 373,663.

Concentration of minerals by flotation. Minerals Separation, Ltd., and S. Tucker. British 373,667.

Sifting apparatus. E. R. & F. Turner, Ltd., and W. C. Kemp. British 374,038.

Separating the constituent parts of a rock mass. Philip E. Billinghurst, Winnipeg, Man. Canadian 323,162.

Unclassified

Process and apparatus for the manufacture of cement-asbestos pipes. Eternit Pictra Artificiale Soc. Anon. British 373,240.

Manufacture of building stones and the like. W. W. Groves (Dr. C. Otto & Co. Ges.). British 373,802.

Slag treatment and apparatus therefor. E. P. Dunn. British 374,008.

Refractory cement. The Koppers Co., Pittsburgh, Pa., assignee of Heinrich Koppers Akt.-Ges., Essen, Germany. Canadian 323,290.

PIT AND QUARRY will furnish, at its actual cost, a copy of any patent cited here. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent Office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is there a fixed charge per copy.

Manufacturers' Publications

Copies of any of these publications may be had by writing the manufacturers who publish them. Please mention PIT AND QUARRY *when writing.*

Electrical Equipment

Fully-Enclosed Fan-Cooled Induction Motors. 4 p. (Bull. 112. Reliance Electric & Engineering Co., Cleveland, O.). Describes and illustrates an improved type of motor said to have accomplished much in the way of reducing maintenance costs where motors are exposed to dirt, dust, moisture or injurious fumes. Across-the-line motors standard for sizes up to and including 30 hp.

Relays Step Forward. 4 p. (General Electric Co., Schenectady, N. Y.). A timely bulletin on the various opportunities for industry to use relays in aiding the efficiency of operation. It explains the availability of the services of G-E relay specialists and lists briefly numerous types of relays.

Suspension Unit for Exterior and Interior Lighting. 4 p. (Bull. 2251. Crouse-Hinds Co., Syracuse, N. Y.). Describes and illustrates an open-type suspension floodlight for the illumination of yards and plants to allow night operation under conditions closely approximating daylight.

Quarry Plants

Telsmith Blue Book. 16 p. (Cat. No. 267-B. Smith Engineering Works, Milwaukee, Wis.). A new quarry-plant catalogue which describes with drawings a number of plant plans and giving complete information as to operation. The plans are basic, each being adapted to a type of construction to fit topographic conditions, market demands and the nature of the deposit.

Safety

Accident Facts—1932. 64 p. (National Safety Council, Chicago, Ill.). A book crammed full of facts and figures regarding accident statistics in industry as well as in homes and public places. Gives the latest data available for the last year together with comparative figures for preceding years. Should be of invaluable assistance to the plant safety director and certainly has a place in the files of industrial operations everywhere.

Separators, Magnetic

The New Dings Type IR Super-High-Intensity Magnetic Separator. (Dings Magnetic Separator Co., Milwaukee, Wis.). An interesting treatise on the separation of such feebly-magnetic substances as iron oxide, garnet, hematite, slate, etc., from non-magnetic substances is contained in the booklet. Also included is a report of important research in the subject of trajectories described by magnetic and non-magnetic materials from an induced roll.

Pumps

The Cameron Motorpump. Folder. (Ingersoll-Rand Co., Phillipsburg, N. J.). Briefly describes a new line of merchandising Motorpumps. Built in sizes from ¼ to 25 hp., good for 5 to 800 gal. per min., they handle everything from "water to near beer," according to the maker. It is a complete unit with built-in electric motor.

Wire Rope

The Splicing of Wire Rope. 36 p. (John A. Roebling's Sons Co., Trenton, N. J.) Graphic illustrations and easily-understood text make this book of extreme value to the plant operator who uses wire rope in one or many applications. It tells just what to do in making splices and points out the things to be avoided. Four types of splice are shown, (1) the standard long splice, (2) the Chicago, or "tied" splice, (3) the long splice for ropes with an independent wire-rope center and (4) the thimble splice for 6-strand ropes.

Miscellaneous

New and Used Machinery—List No. 73. Folder. (The Machinery Sales Co., Chicago, Ill.) Lists a complete line of new and used equipment of almost every variety for use in nonmetallic-mineral operations.

● *Pumpings from the Old Pit* ●

Fifteen Years Ago

TWO new plants, designed by Raymond W. Dull & Co. of Chicago, were being built at Forreston and Pekin, Ill., by the McGrath Sand & Gravel Co. of Chillicothe and Mackinaw, Ill. The company was formerly known as the Mackinaw Sand & Gravel Co.

* * *

An increase in capitalization from $30,000 to $40,000 was announced by the Wolverine Sand & Gravel Co., one of the important producers in the Detroit, Mich., area.

* * *

Ten Years Ago

OPTIONS were taken on 1,000 acres of land containing gypsum deposits at Centerville, Ia., by the Acme Cement & Plaster Co. The company operated several plants in the northern and western states.

* * *

Heavy production was the order of the day at cement plants in the Lehigh Valley district. Base prices at the mills were advanced to $1.90 from $1.75 and a further increase was in prospect.

* * *

The Rockland & Rockport Lime Corp. of Rockland, Me., placed a contract with a New York shipbuilder for the construction of an ocean-going tow-boat and five barges. A separate corporation, to be known as the Rockland Transportation Co., was formed to direct the activities of the vessels.

* * *

Indiana producers were urging that the maintenance department of the state's highway commission allow the use of ⅛-in. to ½-in. gravel as a top-dressing for stone and gravel roads.

* * *

Five Years Ago

MEMBERS of the New York State Crushed Stone Assn. gathered at Rochester for an inspection trip through the new plant and quarry of the Dolomite Products Co. as guests of John Odenbach, president of the concern. Following the visit, the operators motored to Manitou for an outing and dinner.

* * *

The Pacific Portland Cement Co. of Redwood City, Cal., made the largest shipment in its history, loading two steamers simultaneously at the plant wharf with 15,000 bbl. The material was destined for delivery at various Pacific Coast ports.

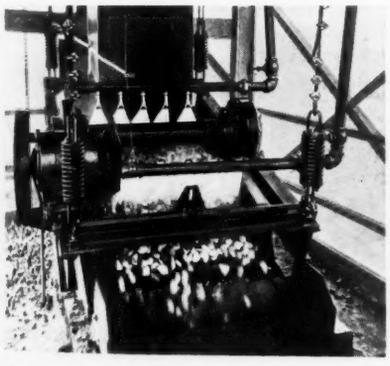
New Machinery and Supplies

Spray Nozzles Simplify Cleaning of Aggregates

A new spray nozzle that has proven particularly efficient in the washing of sand, gravel, and crushed stone has been recently developed by the Chain Belt Co., Milwaukee. The Rex spray nozzle was originally produced for the cleaning of traveling water screens in power plants, where speed of cleaning through force of spray is especially important. The requirements set up in this application have made the nozzle adaptable to many other fields.

The nozzle will not clog with debris usually found in water considered clean enough for washing purposes, as the throat will permit pebbles up to ¼ in. to pass through. The water emerges in a uniform, flat, hard-hitting spray. Any desired washing or scrubbing can be obtained by the proper spacing of the nozzles on the supply pipe together with placing of the nozzles at the correct distance from the surface of the material to be washed.

Surprisingly low water consumption is obtained through the unique



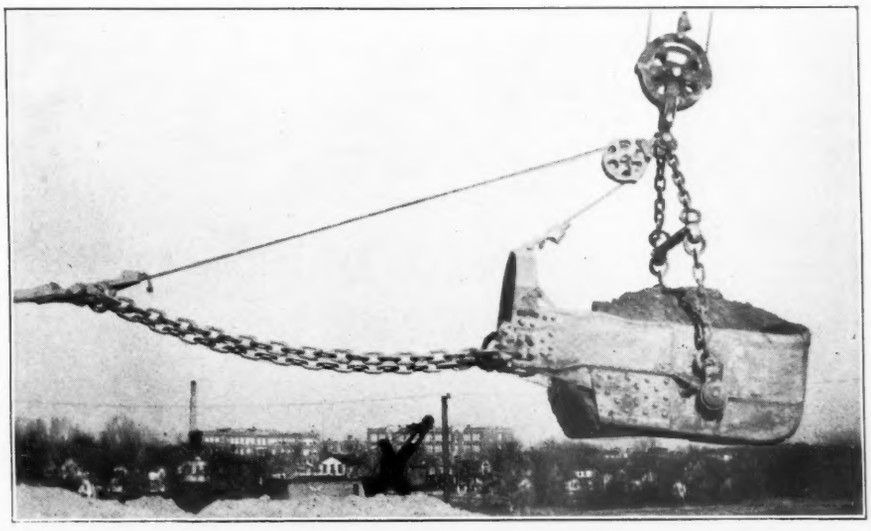
Spray nozzles mounted above a vibrating screen.

design of the nozzle in which a round stream hits a curved deflector plate with retaining sides. The result of this construction is a flat spray free of mist, with all the water powerfully directed toward the material to be cleaned.

The nozzle itself is a complete one-piece die casting of a special formula aluminum bronze. The material is durable and non-corrosive, and is especially resistant to abrasive wear.

Drag-Line Buckets Built in ½ to 8 Cu. Yd. Sizes

The new Red Arch drag-line bucket (Type X) has recently been announced by Bucyrus-Erie Co. of South Milwaukee, Wis. It is a general utility bucket for the average run of drag-line work and is built in sizes from ½ to 8-cu.yd., full measure. Special attention has been given to a design and selection of materials which will give maximum strength and wear with elimination of dead-weight. Operation in the field has shown the new Red Arch fulfills the manufacturer's claim for ready digging, quick filling, easy carrying, and free dumping. Features include the "red arch," a one-piece, annealed steel casting providing great strength without excess weight; a strong, smooth, manganese-steel lip with low-cost renewable manganese-steel teeth; tooth bases cast into lip; teeth secured with simple wedges; inexpensive, easily replaced runners and wearing plates protecting bottom of bucket.



One of the drag-line buckets in operation.

There are many other special features. If you are interested in drag-line buckets we suggest you write the manufacturer for full particulars.

Crane Scale Automatic; Weighs Load in Transit

An interesting application of the principle of weighing in transit is found in the weighing of loads while being lifted or conveyed by cranes, hoists, jibs, tramrail systems or other overhead transportation systems. This combination of weighing and handling into a single operation is made possible by the Kron crane scale, manufactured by The Kron Co., of Bridgeport, Conn.

The scale which is placed in the lifting line and becomes a part of the line itself, indicates the weight of the load on a large dial as soon as the load has been lifted clear of its support, and continues to do so until it has been deposited at its destination, permitting reading of the weight at any point in its journey.

The frame of the scale which houses the simplified lever system with a minimum number of bearing points, is of heavy, steel-plate construction with channel reinforcing. It is capable of supporting a load many times greater than the weighing capacity of the scale.

The design of the dial mechanism provides one-point adjustment, simplifying and speeding adjustment when necessary, and permitting the tester to locate and seal every graduation point from zero to capacity.

A unique sector design offsets all vibration of the scale or load, eliminating vibration of the pointer and allowing more accurate reading.

The designers have gone the limit in simplification of the dial mechanism, reducing the number of bearing points to six. These six pivot points are ball bearings of high-carbon chrome steel with accuracies in tolerance of less than .0001 in. Each bearing is tested for free operation so that friction at the pivot points is practically eliminated, and sealed in a dust-proof housing, no attention being required. The dial mechanism can not be impaired by overloading.

The dial mechanism is interchangeable with that of any other scale of the company's manufacture, regardless of the type or size, permitting replacement from any inactive scale in event of emergency.

The lever-and-dial mechanism is designed to withstand the same shocks, jerks, continuous strains, sudden releases and hard usage given the chains, cables, ropes, etc., employed by the lifting system, without effect on its accuracy or sensitivity.

The large dial has large, clear-cut figures and markings, designed for long-distance reading and is enclosed, together with the dial mechanism, in a dust-proof chromium plated case

and kept clean and protected by a heavy glass face.

A tare beam adjustment inside the frame permits the weigh-man to balance off sling chains, cables, cradles, lifting magnets, containers, etc., giving a net reading on the dial.

The clevis by which the scale is attached to the supporting chain, cable or rod, is securely fastened to both sides of the steel plate frame and, although the weighing mechanism is so designed, constructed and attached to the frame as to support many times the capacity of the scale, an additional safety device is provided which immediately transfers the

The automatic crane scale.

weight of the load to the frame, independent of the weighing mechanism, in event of failure of the latter.

The Kron Crane Scale is made in two types: regular, for general use—and low head, for use where head room is limited. Either type is available in various capacities from 750 to 50,000 lb., and may be had with swivel or rigid hook, or eye-bolt.

Cement-Batch Checker Obviates Human Error

The Harm Turn-O-Matic cement-batch checker, now built by Sprout, Waldren & Co., Inc., of Muncy, Pa., provides pre-mixed concrete producers with an accurate, simple device which records the amount of cement passed through it. It makes it impossible to discharge any batch which might be either over or under the tolerances allowed by law or specification. It meets the demand for a piece of equipment that (1) prevents discharge of batch when overweight; (2) prevents loss through dust seepage; (3) speeds up loading of batches on trucks; is adaptable to weighing cement as it comes from the bin; and (5) meets state requirements for a device which prevents discharge of underweight batches.

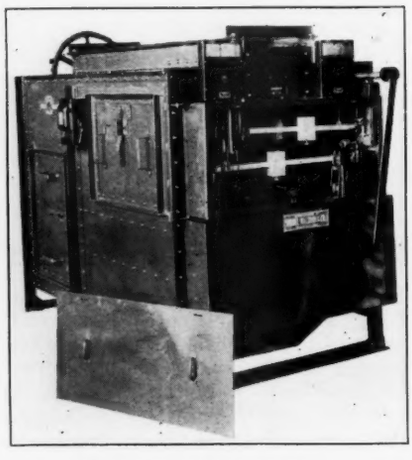
The batch checker consists essentially of a revolving drum suspended on a weighing mechanism. Cement is fed into the drum in the upright position and the drum is inverted to discharge the batch. A rotary valve controls the flow of cement into the drum. A screw feeder serves to speed up the flow when the valve is fully open and prevents arching in the bin. When the valve is partially closed, the screw feed is automatically cut out; this reduces the flow so it may be cut off very accurately.

A two-beam scale is used—one beam for weighing batch and the other for checking the tare weight of the empty hopper. The weighing beam actuates a power turning device which inverts the drum to discharge the batch. The turning device has no contact with the weighing drum during weighing and is engaged only while the drum is actually turning. The only contact between the moving and stationary parts of the weighing device is through the scale pivots and levers. The device is so interlocked that only batches of correct weight—neither over or under more than tolerance allows may be discharged. The tare beam actuates the same turning device to return the drum to charging position after the batch is discharged. Batches between 100 and 800 lb. may be weighed and checked.

The rotary valve is locked during discharging, and until the drum is returned to charging position. An indicator attached to the weight beam informs the operator when the correct weight of cement is in the drum. Another attached to the tare beam indicates when the drum is empty. A means is provided for recording the number of batches which pass through the checker.

The drum mechanism and the turning mechanism are all completely enclosed in a steel housing which may be locked or sealed.

Inspection doors and panels are provided in the housing to allow the placing of test weights and the making of adjustments when required. These doors and panels may be sealed. A special door is provided for the re-



The cement-batch checker.

moval of excess material, should any batch be overcharged, but this door must be closed and locked before the batch may be discharged.

The speed at which the equipment may be operated is noteworthy. An 8-bag batch may be weighed in about 10 sec., and the discharging requires even less time.

Improves Transmission, Clutch on Locomotives

The Whitcomb Locomotive Co., Rochelle, Ill., has developed and incorporated a number of improvements in its mechanical-drive gasoline locomotives.

Whitcomb engineers have designed a transmission which gives practically the same results as the synchro-mesh transmissions, which are coming into common use today. In this transmission, the alloy-steel gears are in constant mesh and speed changes are effected by means of jaw clutches. This eliminates all clashing and breaking of gears and results in a quiet-running and easy-shifting transmission, with resultant long life and low cost of upkeep. All transmission shafts are of alloy steel, which are carried on ball or roller bearings, and in the Whitcomb design the transmission case is not called upon to transmit any power or driving strains.

In heavy industrial work the locomotive clutch must be practically foolproof. It must be simple in design and easy of operation, readily accessible for inspection and repairs, with a high co-efficient of friction, great flexibility and no need of constant adjustments. The Whitcomb cork-insert clutch meets all these requirements.

Whitcomb engineers have recently made a number of important improvements in this clutch, among which is a new method of air operation. This allows the clutch to be engaged or released by a slight pressure of the driver's foot upon the clutch pedal and results in smooth and easy acceleration. An improved clutch brake, mounted on the clutch shaft, brings the clutch to a complete stop before the jaw clutches in the transmission are engaged prior to starting the locomotive.

Splash-Proof Induction Motors Are Announced

A new line of splash-proof induction motors has been announced by the General Electric Co. These motors are designed particularly for application in which open-motor operation is handicapped by the presence of splashing or dripping liquids.

The end shields are of special construction, the top half being solid to exclude dripping water and liquids. Cooling air enters through ventilating openings in the bottom half of the end shields, a special baffle, which extends to the center line of the motor shaft, preventing the entrance of splashing water into the windings.

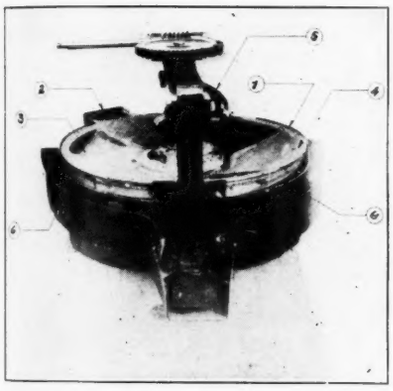
The motor frame is protected against the entrance of dripping water and liquids by a one-piece cover, which is fitted to the motor frame. The ventilating air, which enters through the end shield openings, is circulated over the end windings, across the motor frame, and out through *louvres* in the cover.

Something New Under the Sun

By JOHN J. ZOLLINGER
Oakhurst, N. J.

NOTWITHSTANDING depressions, hard times and common ills, the march of progress must go on. Business methods change continually, in some lines gradually, in others rapidly. Some industries are of such long standing that, through the course of evolution, they have perfected the manufacturing and marketing methods to such an extent, that but few improvements are possible. The sand-and-gravel industry, however, still offers opportunities in every branch—in the construction of plants improvements in machinery and sales methods and in the education of the public in the thousand-and-one ways of using our products.

"Necessity," as the saying goes, "is the mother of invention," and this is true in regard to the new sand-washer and dewatering machine, which I am about to describe. Great efforts have



been made in this field of the industry, and I am sure every producer of sand is interested in new developments along new lines. This particular machine is being handled by the Wright Co., of Old Bridge, N. J., and this company, by the way, is doing big things in a quiet way.

The evolutionary story of this machine is quite a long one, and embodies all the worries and growing pains which we all know so well. For some years a New Jersey concern has manufactured a grade of sand, which is more commonly known as Amboy sand, and is mostly used in connection with asphalt pavement. The grading has to conform to the following specifications:

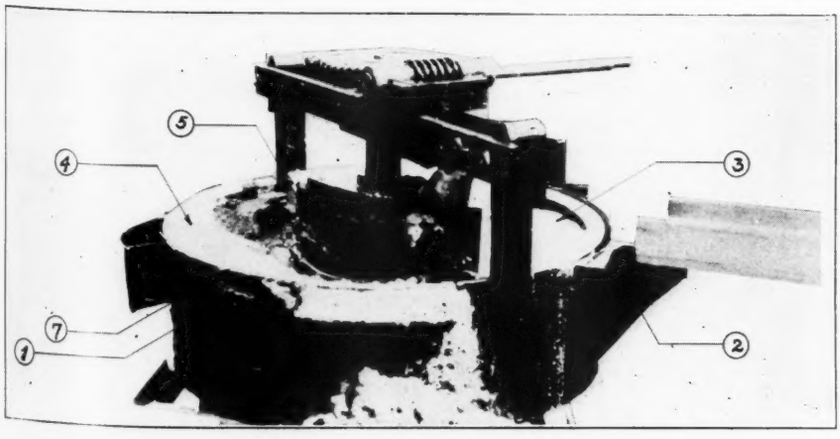
Plus- 10-mesh	0% to 2%
Plus- 30-mesh	10% to 30%
Plus- 50-mesh	15% to 42%
Plus- 80-mesh	20% to 40%
Plus-200-mesh	15% to 35%

It is easily seen, that to wash this type of sand is not an easy problem, particularly since the deposit in question grades 55 to 60 per cent. finer than a 50-mesh screen. Also, nature has slightly complicated things by depositing this sand between nice layers of clay, ranging from 2 to 6 ft. in thickness. There are no fabulous prices obtainable for the product, it therefore has to be produced practically as cheap as concrete sand. After experimenting with almost every known sand-washing device, the results still remained unsatisfactory, and efforts were therefore concentrated upon new principles and entirely different methods. How well these efforts turned out is shown by the new machine which, as will be seen, is a mechanical washer, has an uncanny production capacity, washes the material thoroughly, and discharges the finished product with the minimum agitation. The principle of operation is very simple. Perhaps, readers are acquainted with the method of replenishing the water supply of a locomotive by means of scoops, while the train is in motion. This, roughly, indicates the mode of operation, while the pictures clearly illustrate the construction of the machine.

In the pictures 1 is the main or settling tank, with the inlet at 2. The material enters at the bottom of the tank, and is removed or distributed by the scoops, 3. It is easily apparent that the entire area of the tank is used as a settling basin, since the scoops continually clear a pathway for new material. As the sand accumulates, the action of the scoops raises it out of the water to the flat portion of the rotor member, 4, from which it is removed by the stripper, 5. Although the rotor, 4, may be adjusted below the overflow level, 6, any excess water is discharged into the main tank over the edge of the rotor at point 7. The machine does not ship water at any time, whether the feed is increased or decreased, or whether the machine is turned over with only water in the tank. It must be kept in mind that dewatering takes place as soon as the scoops build up sand,

that is, the voids are being closed and the water displaced by compressing the sand and as the material reaches the stripper blade, the moisture content is about 20 per cent. Additional draining takes place at this point, and as the sand is discharged, it may easily be conveyed on a belt, or loaded directly into scows, cars or trucks. The stripper, 5, clears the rotor, 4, by approximately ¼ in., so that no wear occurs at that point. Also, the scoop angle is designed of such a degree that the material moving upward moves on its own surface, the entire wear therefore being negligent. Two strippers arranged opposite one another may be used to speed production, which, of course, would be accomplished at the cost of higher moisture content. Roller-bearings are used for the main shaft and there is a roller-bearing under the large gear to take the downward thrust. The machine and drive are horizontally arranged, and the discharge is on the same level with the inlet. A 6-ft. diameter machine of this type produces from 40 to 50 tons per hr. with a power consumption of 3½ hp.

The machine's outstanding characteristics are the facts that the overflow extends practically over one-half of the entire circumference of the tank and that no agitation or disturbance takes place, while removing the washed material. Also, any material, once settled, may be removed without loss from washing away, since the sand is gradually elevated out of the water with a minimum of voids, and drainage takes place without affecting or washing away any material in the process of dewatering.



Saving Through Safety

Winners of National Competition Selected

List 54 quarries for honorable mention after going through 1931 without lost-time accidents

OUTSTANDING safety accomplishments in the longtime operation of mines and quarries without accidents or with quite low accident rates were recognized in the announcement of the winners of the National Safety Competition of 1931, made by Scott Turner, director of the United States Bureau of Mines, which sponsored the contest. Approximately 350 mines and quarries in 34 states participated in the competition, and 68 large operations had no lost-time accidents. The competing companies were divided into five classes: anthracite mining companies, bituminous-coal mining companies, metal mining companies, operators of nonmetallic-mineral mines other than coal mines, and quarries or open-cut mines. A replica of the bronze trophy, "Sentinels of Safety," donated by *The Explosives Engineer*, was awarded to the winning company in each group.

In the nonmetallic group, first place was given to the Retsof rock-salt mine, Retsof, N. Y., operated by the Retsof Mining Co., which had no lost-time accidents during a period of 354,172 man-hours of operation.

In the group comprised of quarries and open-cut mines, the winner was the Mahoning open-cut iron-ore mine, Hibbing, Minn., operated by the Mahoning Ore and Steel Company, which operated 339,722 man-hours without a lost-time accident.

Among the nonmetallic-mineral mines the following were honorably mentioned: Akron gypsum mine of the Universal Gypsum and Lime Co., Akron, N. Y. (this mine operated 60,365 man-hours with no lost-time accidents); Independence limestone mine of the Missouri Portland Cement Co., Independence, Mo.; No. 6 gypsum mine of the United States Gypsum Co., Plasterco, Va.; and Bell limestone mine of the American Lime & Stone Co., Bellefonte, Pa.

In the quarries group, the following operations were given honorable mention. All these quarries operated without a lost-time accident:

Ormond quarry, Lehigh Portland Cement Co., Ormond, Pa.
Columbia limestone quarry, Pittsburgh Plate Glass Co., Zanesville, O.
Fogelsville quarry, Lehigh Portland Cement Co., Fogelsville, Pa.
Glens Falls quarry, Glens Falls Portland Cement Co., Glens Falls, N. Y.
Hanover limestone quarry, Bethlehem Mines Corp., Hanover, Pa.
Martinsburg Nos. 5 and 6 limestone quarries, North American Cement Corp., Martinsburg, W. Va.
Rock Hill traprock quarry, The General Crushed Stone Co., Quakertown, Pa.
Mason City limestone and clay quarry, Lehigh Portland Cement Co., Mason City, Iowa.
Hillsville quarry, Union Limestone Co., Hillsville, Pa.
Sandt's Eddy quarry, Lehigh Portland Cement Co., Sandt's Eddy, Pa.
Natural Rock asphalt quarry, Natural Rock Asphalt Corp., Natural Rock, Ky.
Birdsboro quarry, John T. Dyer Quarry Co., Birdsboro, Pa.
Akron quarry, General Crushed Stone Co., Akron, N. Y.
Catskill quarry, Alpha Portland Cement Co., Alsen, N. Y.
Nazareth quarry, Lone Star Cement Co., Nazareth, Pa.
Rock-Cut limestone quarry, General Crushed Stone Co., Syracuse, N. Y.
Union Bridge quarry, Lehigh Portland Cement Co., Union Bridge, Md.
Security quarry, North American Cement Corp., Security, Md.
No. 7 sandstone quarry, Cleveland Quarries Co., Amherst, O.
Middlefield trap-rock quarry, Connecticut Quarries Co., Inc., Wallingford, Conn.
Naginey limestone quarry, Bethlehem Mines Corp., Naginey, Pa.
Knippa No. 4 trap-rock quarry, Southwest Stone Co., Knippa, Tex.
Cowell quarry, Cowell Portland Cement Co., Cowell, Cal.
Thomaston quarry, Lawrence Portland Cement Co., Thomaston, Maine.
Gasport dolomite quarry, Wickwire Spencer Steel Co., Gasport, N. Y.
Tulsa quarry, Zenith Limestone Co., Tulsa, Okla.
Union Furnace quarry, American Lime & Stone Co., Tyrone, Pa.
Steelton limestone quarry, Bethlehem Mines Corp., Steelton, Pa.
Birmingham quarry, Lehigh Portland Cement Co., Tarrant City, Ala.
Iola quarry, Lehigh Portland Cement Co., Iola, Kan.
Speed quarry, Louisville Cement Corp., Speed, Ind.
Mitchell (Lehigh Lime Co.) quarry, Lehigh Portland Cement Co., Mitchell, Ind.
Martins Creek No. 4 quarry, Alpha Portland Cement Co., Martins Creek, Pa.
Dewey quarry, Dewey Portland Cement Co., Dewey, Okla.
San Vicente quarry, Santa Cruz Portland Cement Co., Davenport, Cal.
Oglesby quarry, Lehigh Portland Cement Co., Oglesby, Ill.
Nazareth quarry, Nazareth Cement Co., Nazareth, Pa.
Marcen quarry, Pennsylvania-dixie Cement Corp., Gate City, Va.
Clearinghouse quarry, Yosemite Portland Cement Corp., Clearinghouse, Cal.
Dallas quarry, Lone Star Cement Co., Texas, Dallas, Tex.
Hendlers quartzite quarry, General Crushed Stone Co., Wilkes-Barre, Pa.
Petoskey quarry, Petoskey Portland Cement Co., Petoskey, Mich.
Brooksville lime rock and clay quarry, Florida Portland Cement Co., Brooksville, Fla.
Concrete quarry, Superior Portland Cement, Inc., Concrete, Wash.
Duluth trap-rock quarry, Duluth Crushed Stone Co., Duluth, Minn.
El Paso quarry, Southwestern Portland Cement Co., El Paso, Tex.
Stockertown quarry, Hercules Cement Corp., Stockertown, Pa.
Fort Dodge quarry, United States Gypsum Co., Fort Dodge, Ia.
Plant No. 4 quarry, Pennsylvania-Dixie Cement Corp., Nazareth, Pa.
Dallas quarry, Trinity Portland Cement Co., Dallas, Tex.
Bonneville quarry, Lawrence Portland Cement Northampton, Pa.
Rocky Hill trap-rock quarry, Connecticut Quarries Co., Inc., Rocky Hill, Conn.
Dixon quarry, Medusa Portland Cement Co., Dixon, Ill.
San Andreas quarry, Calaveras Cement Co., San Andreas, Cal.

In determining the relative standing of the various companies enrolled in the competition, all mines and quarries were graded according to their accident-severity cases; that is, according to the number of days of disability of employees on account of accidents in proportion to the number of man-hours of work done by all employees.

First Safety Trophy for Iowa Dedicated

The Portland Cement Assn. safety trophy was presented to the Pennsylvania-Dixie Cement Corp. plant in Iowa July 7 at a public ceremony at the plant near Valley Junction.

The honor was accorded the plant in recognition of its operation through 1931 without a lost-time accident. It was the first time an Iowa cement plant has won the trophy.

Presentation of the monument was accompanied by an extended program in charge of R. A. Bechtold, plant superintendent.

Raising of the American flag by members of the Valley Junction post of the American Legion was followed by the invocation by the Rev. Sherman Moore of Valley Junction.

Mayor P. L. Riley of Valley Junction welcomed the guests and complimented plant officers and employees upon their record.

Stanley Owens of Chicago, safety engineer of the association, made the presentation address as four little girls pulled the ribbons which unveiled the trophy.

Harley Matherley, raw mill operator and leader in safety work at the plant, accepted the trophy on behalf of the employees.

Blaine S. Smith of New York, president of the Pennsylvania-Dixie Cement Corp., which operates eight mills throughout the country, followed with an address in which he emphasized that he came to Des Moines particularly to help celebrate the winning of the trophy.

Cedar Rapids Operator Adds Gyratory Crusher

Remodeling operations at the Larimer & Shafer Co., stone-products plant, Cedar Rapids, Ia., have been completed with an outlay of nearly $100,000, the major improvement being a gyratory crusher capable of handling 6-ft. rock.

Contracts held by the company, mostly on road work, will keep the plant busy until late in fall. A Benton County contract alone calls for $40,000 worth of crushed stone.

Designing the Belt-Conveyor and the Selection of a Proper Drive

HANDLING large quantities of material, such as sand, gravel, crushed stone, dirt, etc., at low cost, is work to which the belt-conveyor is admirably suited. Its large capacity and small power consumption result in a very low cost per ton of material handled.

The proper design and wise selection of the parts that make up the belt-conveyor determine the efficiency or the success of the installation. The most important elements, according to Link-Belt Co., are:

1. The Belt, to carry the material.
2. The Idlers, to support the belt.
3. The Drive, through which power is transmitted to the belt.
4. The Loading Conditions, or method of delivering material to the belt.
5. The Tripper, or other means of discharging material from the belt.

Each element 1, 2, 3 and 5 is made up in various types, and each type of drive, idler, belt, or tripper, has a proper use.

Since the belt is the only part which comes into direct contact with the load, it is the only part which is subjected to the wear and tear of handling the material. It is, therefore, the most expensive part of the conveyor from a maintenance standpoint. Every means should be taken to select a belt which is the most economical in the long run, and to protect it from unnecessary injury and wear, thus adding to its life of service.

Loading conditions are important, as everything should be arranged to have the material reach the belt in the same direction and speed of motion as the belt has; and with as little drop and impact as practicable, especially where the material is abrasive, or sharp pointed and heavy.

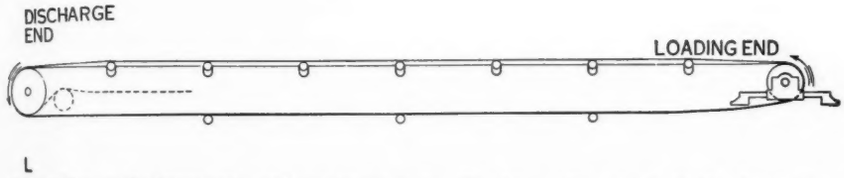
Belts should be specified according to the conditions under which they are to operate, and weight of fabric, number of plies, and thickness and grade of rubber covers, must be properly combined to secure the most economical service.

Anti-friction idlers are recommended in all cases when long life of equipment, and low maintenance costs, are given due consideration.

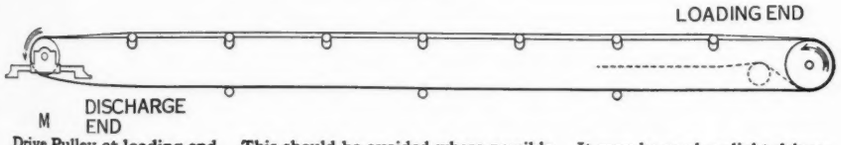
The use of the proper type of drive may mean the saving in cost of an extra thickness of conveyor belt, or an important reduction in belt stress. The proper relation between belt stress and thickness and grade of rubber cover, should be given careful consideration in the selection of the type of drive, and the grade of belt.

Both the drive and the idlers determine the efficiency of the belt conveyor, and the number of plies or thickness of conveyor belt necessary to transmit the belt tension or pull required in driving it.

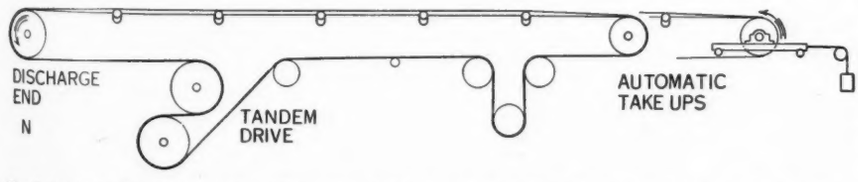
In the accompanying diagrams the expression "drive pulley" indicates the pulley which gives motion to the conveyor belt, whether it be the head or tail pulley or located at some intermediate point.



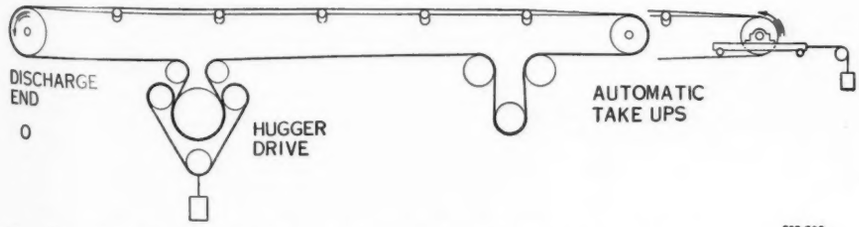
Drive Pulley at discharge end—with or without snub. The drive pulley may be Rubber-Lagged or Unlagged, depending upon the length of conveyor and belt pull. As the coefficient of friction between conveyor belt and rubber-lagged pulley is .35, the drive having lagged pulley transmits more belt pull than one provided with an unlagged pulley, which has a coefficient of only .25. The Snubbed Pulley drive, shown dotted, secures a greater arc of contact on the driving pulley (Link-Belt assumes 215° in its Belt Conveyor Engineering Data Book No. 1615), and thus furnishes more pull without danger of slipping.



Drive Pulley at loading end. This should be avoided where possible. It may be used on light drives, where to drive at the other end would be impractical or inconvenient.



Tandem Drives for heavy work. This type of drive can be located at any convenient point on the return belt, either near the head or tail end; or the conveyor can be arranged to discharge over one of the Drive Pulleys. Conveyors equipped with drives of this type should be provided with automatic gravity take-up.



The Hugger Drive can be applied in the same manner as the tandem drive, except that it cannot be placed at the end of the conveyor. It is more efficient than the tandem drive, and has no differential slipping action between the belt and pulley, which is so destructive to the belt.

Bulletin on Limestone Resources of Illinois

Persons or companies interested in limestone and its many uses may be glad to learn of the existence of a comprehensive bulletin published in 1925 by the Illinois State Geological Survey and entitled, "Limestone Resources of Illinois."

The book contains 392 pages, is well illustrated, and includes numerous tables showing the geologic and geographic distribution of the various limestone formations of Illinois, the location of possible quarry sites, the results of physical and chemical tests of hundreds of samples, and the properties of various deposits which are suitable for use as a high-grade building stone.

The methods of sampling and testing are also described, with special reference to standard requirements for highway materials, to general quarry practices, and to specifications for twenty-one major uses of limestone and dolomite.

The bulletin is also planned to serve as a reference bcok, since it describes, by counties, the characteristics of the rock in both existing quarries and possible quarry sites, as well as production methods employed throughout the state.

Due to recent progress in the technology of testing, changes in specifications and equipment, and also to recent industrial reorganizations, certain limited parts of the report are invalid, but for most purposes, the book will prove to be a valuable addition to the bibliography of the stone and stone-using industries.

The bulletin (No. 46) may be secured at the cost price of $1.25 by addressing the State Geological Survey, Urbana, Illinois.

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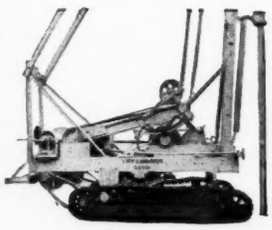

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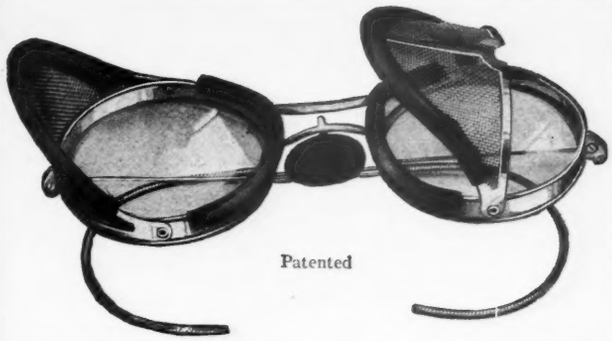

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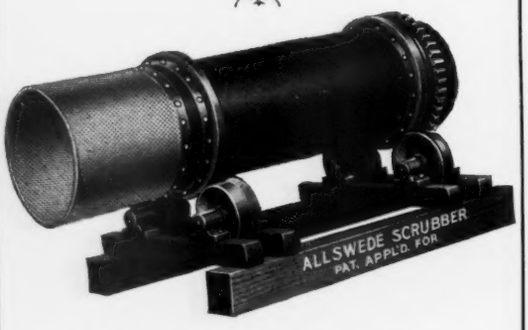

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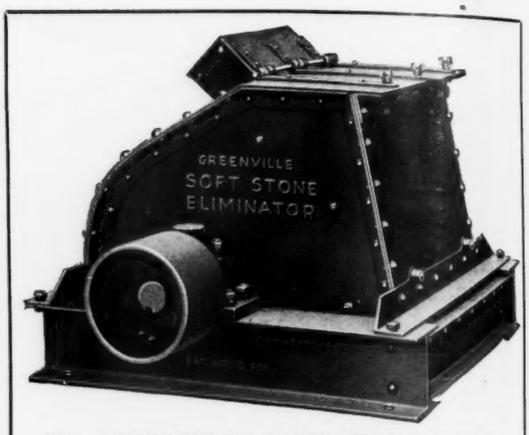

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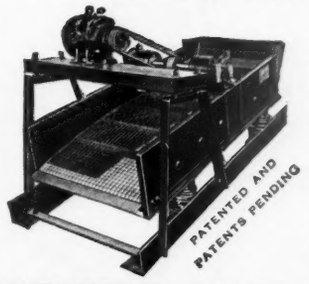

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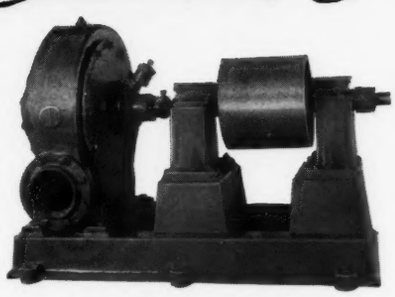
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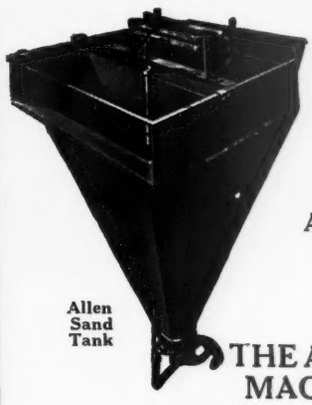

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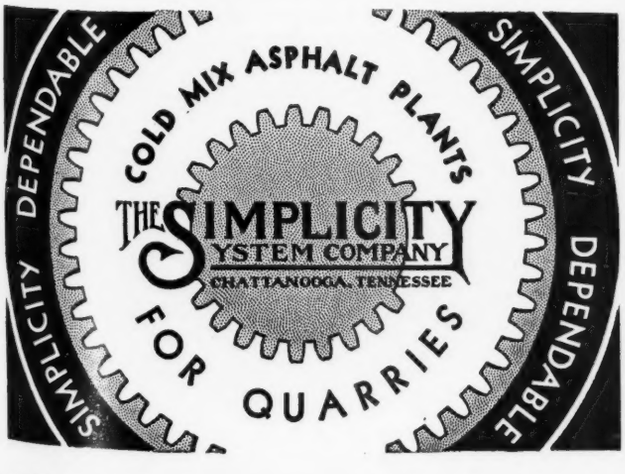

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1-200	F. M.	440	Slip Ring	600
1-200	Wsthse.	220/440	Sq. Cage	585
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Sufficient machinery to manufacture 10,000 tons of agricultural lime per year, and to crush 100,000 tons of crushed stone for road construction. Complete modern concrete block and tile plant equipped to make two million concrete blocks and tile per year, as well as Concrete Silo Staves, Concrete Burial Vaults, and fancy concrete pottery.

Large tube mill to grind raw stone into limestone flour, capacity 25,000 tons per year.

Farm land in connection with quarry, in high state of cultivation, dwelling and farm buildings in first class condition, with all city conveniences.

This plant has a well established trade, and has shown a large profit every year, 1931 being a banner year. Sufficient orders booked for 1932 to show a good profit.

Write for full particulars,

Address Box 402,

PIT & QUARRY, 538 S. Clark St., Chicago, Illinois.

FOR SALE

1—Whitcomb 12-ton—36″ gauge—6 cylinder—Gasoline Locomotive.

4—Side Dump Koppel Industrial Cars—36″ gauge—5 yds. capacity.

150—tons—40#—35# and 30# replaying rails.

All this equipment in first class condition. Located at Lucinda, Clarion County, Pa.

THE NILES FIRE BRICK COMPANY
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FOR SALE

1—10″ Gould Centrifugal Pump direct connected to 40 HP Electric Motor. 3000 G.P.M. 38′ head. Guaranteed practically new. Very reasonable.

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DIAMOND DRILLING

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GUARANTEED 100% PERFECT

Considerably below market prices.
20 ton ⅞-in. Hexagon.
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Exceptional opportunity to acquire most economically operated quarry in So. West Kentucky. Plant of 1000 to 3000 tons capacity. 50 acres Grade A stone. Practically no stripping.

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4 Cylinder Engine 5½x7
2 Cylinder Compressor 8x6
Complete, ready for service
Price $740.

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Price $480.

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1-yd. **NORTHWEST CRANE-DRAGLINE.** Shop No. (2,000 series), late type crawlers, Twin City Engine, 40-ft. boom, only used 6 mo.'s, excellent condition, price $3,250 Chicago. Address Box No. 604, Pit and Quarry Publications, 538 S. Clark St., Chicago.

Bargains—Priced Right!

Rebuilt Lima 101 shovel.
Byers 1 -yd. steam shovel, crawlers.
Byers ¾-yd. Gas shovel.
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National D.D. hoist with 100 H.P. G.E. 3-P-60-cycle 220 Volt motor, 1-yd. Sauerman drag scraper bucket.

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Surplus Equipment

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Jaw Crusher — Wheeling — 9x16
Used One Month—like new
Bargain to move quickly.

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WE LOOK INTO THE EARTH

By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.

PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

The PIT AND QUARRY Employment Service for subscribers has registered the following applicants for positions. Perhaps you have an opening in your organization for one of these men. If so, PIT AND QUARRY will be pleased to put you in touch with the applicant if you will advise us which one fills your requirements.

1-A. 12 years' experience Highway construction and sand and gravel. Can design and install own pits. Ready-Mix concrete. Have operated Central Mixing plants.

4. Stone Quarry Supt. or Supt. asst. 12 yrs. experience in commercial stone and railroad ballasting; operating and repairing all kinds and makes of equipment. Wide experience in drilling and blasting. A-1 references.

5. Chief engineer cement plant; 10 years' experience; desires connection with engineering or manufacturing firm, either in the office or in the field.

9. Quarry foreman, 6 years' experience.

10. Superintendent; 10 years' experience; lime and stone.

11. Superintendent crushed stone; 25 years' experience.

12. 10 years' experience in production of crushed gravel and sand; design engineer and builder; general superintendent; has had some sales experience. Experience covers the entire field.

14. Thoroughly experienced superintendent who has also in the past been assistant superintendent and foreman of granite and lime quarries; at present not employed.

15. Experienced superintendent or manager; graduate engineer; 12 years' experience in sand and gravel production and plant design.

16. Superintendent, 30 yrs. experience, mine, mill and quarry and large shovel operations, thorough knowledge of various systems of underground and open pit mining. Development work from grass roots to mill construction and operation, copper, iron, zinc and non-metallics, 4 yrs. special work in asbestos, mica and kaolin, good organizer and good production and safety record but not a college graduate. South, Southwest or Tropics preferred.

18. Superintendent of stone crushing and sand and gravel plant with considerable experience in operation of dredges, draglines, electric and steam shovels, all kinds of crushing, conveying, screening equipment. Can furnish excellent references, good record and details of past experience.

19. Electric Shovel Operator with considerable experience. Also power-house and general electrician, maintenance, welding, repairing gasoline truck motors, crushers, screens and various kinds of equipment.

20. Crushed stone superintendent since 1903; prefer West or Southwest territory; thoroughly experienced in construction and operation of plants, know how to get best results from the quarry end.

21. Cement plant superintendent or heavy limestone quarry; 20 years' experience in construction and operating plants.

24. Superintendent, stone quarry or slag plant 16 years office and operating experience.

25. Dragline, Crane and Shovel Operator, 9 years' experience in steam and 3 years on electric shovel (Marion), desires position as operator. Can do own repairing. Permanent connection desired. Married. References furnished. Will go anywhere, but a location near good schools preferred.

26. Operator with 5 years' experience on Link-Belt and Koehring cranes. Also 7 years' experience in sand and gravel pit. Available now. Go anywhere.

27. Laboratory work, 3 years' experience as Asst. Chemist doing control and analytical work. College graduate, B. S. degree.

28. 12 years' experience as cement burner and night foreman and watchman.

29. 14 years' practical quarry experience, office, sales, management, superintendent, reconstruction, etc. Open for new connection with progressive company, preferably sand and gravel concern.

30. Crushing plant and quarry Superintendent. Experience includes erecting, rebuilding and repairing machinery. Successful in organizing labor for economy. References furnished.

31. Superintendent crushing plant. 10 yrs. limestone and rock asphalt quarry operation experience. Can furnish best of references. Will go anywhere.

32. An overhead traveling bridge crane man. Experienced. Can give good references. Willing to go anywhere.

33. Cement mill general foreman, 12 years' experience, familiar with all requirements in construction and operation. Available immediately. Can locate anywhere. Single.

34. Capable man. 53 years old. Married, experienced in quarry and crushing plant, timekeeping, payroll and plant office work, seeks position as assistant superintendent, general foreman or plant office work, where experience and loyalty will be appreciated. Will not be interested in investing money at the present time in any position. Have you an opening?

35. Superintendent of crushing and quarrying plant. 14 yrs.' experience in cement business, including changing plants from dry to wet process. Can furnish references.

36. Cement Mill Chemist with 4 years of cement mill work on both wet and dry processes, and 8 years of wide experience in organic analytical work covering all problems incidental to the manufacture of cement.

37. Office man experienced in general office work, correspondence, sales and operations, desires similar position with large lime, cement or gypsum concern. Nine years with Southern lime firm. Age 27, single. Willing to locate anywhere. Available immediately.

38. Situation wanted as Manager or Superintendent of a progressive crushed stone plant where ability and experience would be appreciated. 38 yrs. of age. Scotch birth. American citizen. 15 yrs. experience in quarrying and crushing plants. Now available. Best of references. Location in eastern or middle states preferred.

39. Ten years experience as Burner man; reliable Age 37. Desires position where ability and skill will be appreciated by advancement. Available immediately.

40. Man with 10 years practical experience in civil engineering and highway construction of all kinds as well as bridges, grading, culverts, etc. Understands map making and topographical survey. Included with this is 4 years tracing and drawing. 3 years with army engineers in Panama. Salary no object.

42. General superintendent or manager; experienced graduate engineer.

43. Sales Engineer desires making change, preferably New England territory. 20 yrs. experience with a reputable concern designing, estimating and selling material handling equipment in all phases. Broad acquaintance among executives and buyers.

44. Want position as carpenter or millwright, capable of taking charge of gang. Steady work preferred with cement company.

45. Operator with ten years' experience on Bucyrus-Erie Steam and P. and H. Gas Shovels in grading, gravel pit and stone quarry work. Can furnish references.

46. Gravel plant supt. or manager. 10 yrs. supt. of large railroad and trucking plants. Experienced in erection and care of gravel plant equipment. Can furnish best of references. Services available at once. Will go anywhere.

47. Graduate Engineer. 25 yrs'. experience as designing, constructing and operating Engineer, as well as Supt. of stone crushing and gravel washing plants, also heavy rock blasting.

48. Graduate Engineer. Wide experience as mining, consulting and sales Engineer, in charge of all outside operations, construction and maintenance. A-1 references.

49. 15 yrs'. experience in erecting and operation, crushing, grinding, washing, drying, screening and separation plants. Know value of low production costs. Good references.

50. Gravel Plant Supt. 7 yrs'. experience erecting and operating gravel plant equipment for large manufacturer. 2 yrs. in charge of mining operations in Brazil. Best of references.

51. Supt. of crushed stone and gravel plants. 12 yrs. experience. Familiar with maintenance and repair work on all types of equipment. Can handle men. First class references.

52. Past experience with Crushed Stone and Sand and Gravel plants; in sales, can figure with contractors, scales, cost, timekeeping, bookkeeping, general all-around man.

53. Quarry superintendent with years of experience in all operations, such as stripping, drilling, blasting, shovel loading, crushing, sinking, also repairing of all quarry equipment and familiar with all phases of washing crushed stone. Now open for proposition. Excellent reference.

54. Engineer experienced in Mechanical, Structural, Electrical, Plant Design and Layout, Estimating, Field work, Maintenance and Millwork desires position. Will locate anywhere.

55. Superintendent of crushed stone products plant and quarry. Twenty years' experience in this and foreign countries in charge of operations. Familiar with modern up-to-date methods and profitable application of same.

56. Master Mechanic, thoroughly trained in the upkeep of crushers, steam shovels, gas and diesel equipment, etc. Reference and complete information on request.

Can You Use THESE MEN ?

Employment Dept.
PIT AND QUARRY
538 So. Clark St. Chicago, Ill.

57. General operating Superintendent desires position with progressive Lime or Cement Company. 20 years' experience as operating superintendent and master mechanic. Familiar with Limestone quarries and burning of limestone and Portland Cement with natural gas or Producer gas. Master Mechanic of large Lime and Cement plants. Installed reasonable system which did not bar progress of operation. References A-1.

58. Position as Superintendent by graduate Mining Engineer. 35 years old with wide operating experience in large open pit mines and crushed stone plants up to 10,000 tons. Thoroughly experienced in Quarry layout, development, heavy blasting, shovel loading, transportation and mill design and operation, electric or steam power, and with latest type high speed reduction crushers, screen analysis of a sampling and grading of specification stone.

59. 13 years' experience in general office work, including correspondence, sales and operations. Well acquainted with freight rate structures on crushed stone, sand and gravel and cement. Desire connection with any concern where ability and experience would be appreciated.

60. Slackline Cableway operator. 5 years' experience. Can keep cableway operating at full capacity. Can do repair work. Had experience raising and lowering mast or tower. Can do all necessary rigging around cableway.

61. Wants position as foreman of a rock, sand and gravel, or oil-mix plant, preferably the latter. Several years' experience as foreman of oil-mix and hot stuff proportioning plant. Can furnish best of references from previous employers and contracting engineers. Will go anywhere but prefer the west or middle west.

62. Position wanted as quarry superintendent. Prefer southwest or west coast.

63. Stone Quarry Supt. or Supt. asst. 14 yrs. experience in commercial stone and railroad ballasting; operating and repairing all kinds and makes of equipment. Wide experience in drilling and blasting. A-1 references.

64. Position wanted by operator with 15 years' experience on cranes, shovels, draglines, sand pumps, dredges, etc. 35 years of age, can furnish A-1 references. Will go anywhere.

65. Graduate mechanical and structural engineer with wide experience on cement and stone plants. Permanent or temporary employment.

66. Superintendent or Foreman of Quarry and Crushing plant or Sand and Gravel plant. 30 years' experience. Can make good anywhere. A-1 references. Available now and will locate anywhere at moderate salary.

67. Successful manager of stone crushing plants, also sand and gravel pits, desires position where previous experience will prove of mutual benefit. Can also sell sand, gravel and stone products or machinery and electrical equipment.

68. Superintendent and Foreman with wide experience in operation of slag, sand and gravel and stone plants. Also experience in railroad work, road construction, grading, ditching, bridges, concrete work, all kinds of excavation, government inspection. Can operate gas and electric cranes. Best of references.

69. Engineer and draftsman, fifteen years' experience, machinery design; structural; plant layout, development, thoroly acquainted with architectural and mechanical design. Technical graduate, also business management and administration course, Alexander Hamilton Institute. Field and office experience. Age 37 years. References.

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***See also information in the 1932 Pit and Quarry HANDBOOK**